THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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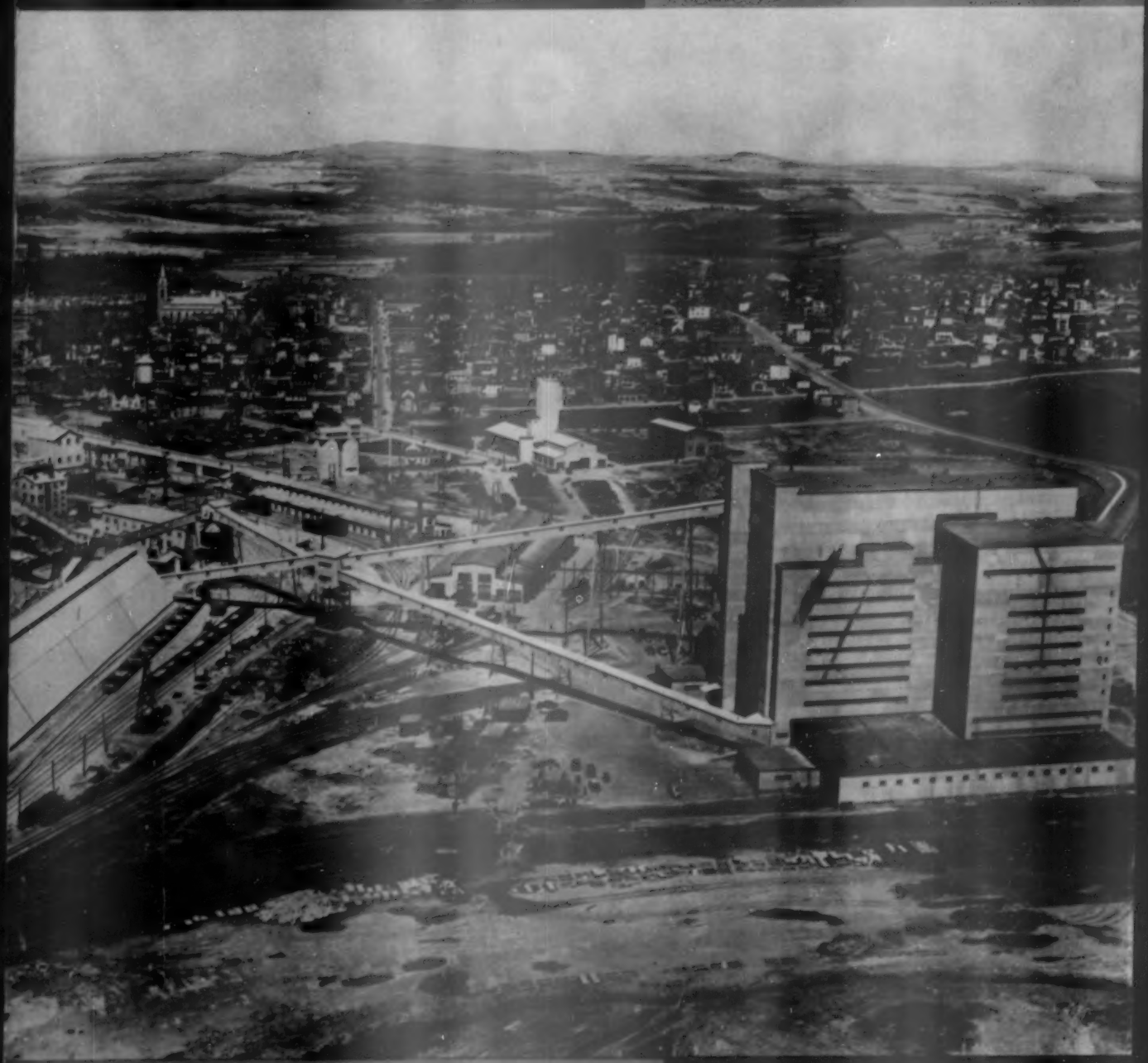
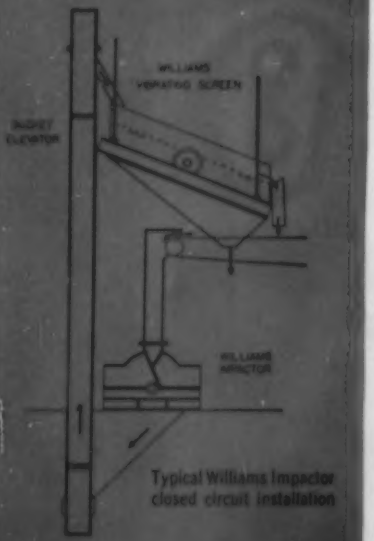


Aerial view of Canadian Johns-Manville Co., Ltd., Jeffrey Mine at Asbestos, Que.

Lowest-Cost Crushing

with better product control

Open view showing hammers and impact blocks. Extremely rugged, heavy construction of steel plate with manganese steel liners, hammers and impact blocks. Extra large shafts are mounted in oversize bearings sealed in self-aligning housings.



Typical Williams Impactor closed circuit installation

WILLIAMS *Reversible* IMPACTOR

By properly controlling the forces of speed and mass in size reduction operations, Williams Impactors offer the lowest possible cost-per-ton in producing top quality materials from 2" down to 35 mesh with a minimum of fines . . . or much smaller where more friable products are handled. In closed circuit systems with external vibrating screens, a single Impactor promises 100% product sizing with surprising economy, even with the most difficult specifications.

No grates are required, hence no replacement expense of these parts is necessary. Quick, uniform reduction, sizing and discharge from the mill eliminates any grinding attrition action that causes excessive wear, especially if raw materials are highly abrasive. Reversible rotation eliminates manual turning of hammers and minimizes down time. Impact blocks are also reversible which further reduces cost. Parts last up to 7 times longer than in other types of equipment. Unusually low maintenance is a feature of the Impactor.

You have much to gain in lower costs and better product quality control with an Impactor. *Write for literature.*

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

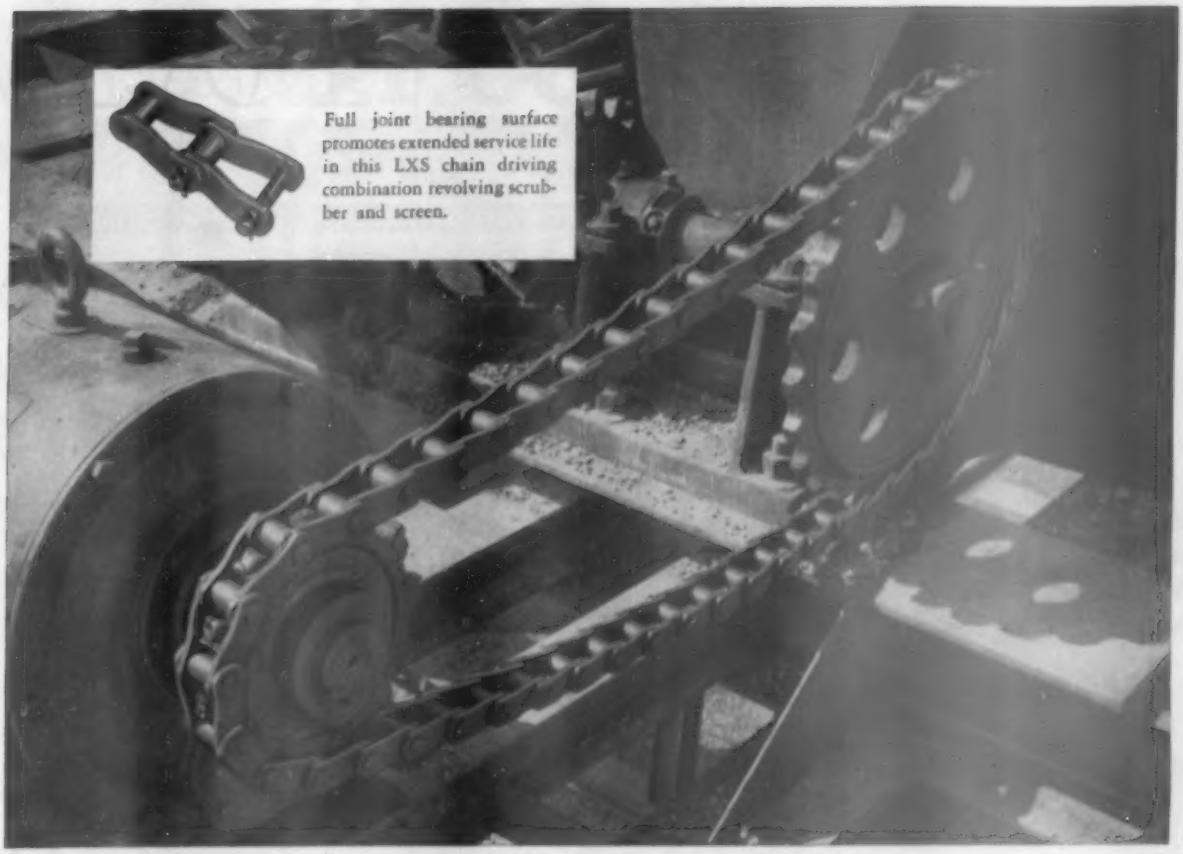
800 St. Louis Ave. **St. Louis 6, Mo.**

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

Hammer Mills Helix-Seal Mills Roller Mills Air Separators Vibrating Screens Feeders

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD



Full joint bearing surface promotes extended service life in this LXS chain driving combination revolving scrubber and screen.

For heavy-duty, exposed drives -- it's LINK-BELT LXS chain

LINK-BELT offers the chain that's best for every drive and conveying job

Accurate sizing of pins, bushings and pitch holes in Link-Belt LXS chains assures a tight fit of mating parts. This plus many other important features promotes longer chain life. That's why they are so widely used for exposed drives subject to repeated heavy loads and high impact.

Similarly, for other types of power transmission and conveying, Link-Belt builds chains with the characteristics required by the job. And it's this completeness of line that gives you the *right* chain for *your* requirements.

Ask your nearest Link-Belt office or distributor for the facts on the complete Link-Belt line of chains and sprockets.

No ONE chain serves every purpose — get the RIGHT one from Link-Belt's complete line

Class 800 ley bushed chain—for heavy duty, abrasive conveying and elevating.

Class C combination chain—popular, durable, low cost design for elevators, conveyors.

Class SS bushed roller chain with straight sidebars—particularly suited for apron conveyors, slat conveyors.

Link-Belt "Flint-Rim" cast sprockets give extra long life. Cast steel sprockets for most severe service.

12,501-A

LINK-BELT

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ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY — LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Shakedown by three rubber toughs

A typical example of B. F. Goodrich improvement in rubber

COAL gets packed in those freight cars so tight it won't come loose when the hopper at the bottom is opened. Men used to crawl in the car and using pick and shovel, break it loose. Sometimes it took two men eight hours to unload a car, and more important, it was dangerous.

Then a machine was developed that's put on the side of the car and shakes the material loose. The shaking is done by three B. F. Goodrich Grommet V belts driving a shaft that's out of round and off balance. Many kinds of V belts were tried but broke from the teeth-chattering vibrations.

But the B. F. Goodrich V belt, with two husky grommets imbedded deep in rubber, can take and recover from shock with no ill effects. A grommet is made by winding rayon cord into an endless loop. Now, push a button and the cars are unloaded in ten minutes.

Product development and improvement are always going on at B. F. Goodrich. Every product B. F. Goodrich makes—V belts, conveyor belts, hose and many other things—is constantly being studied to see how it can be made to last longer and do a better job.

How this cuts your costs: Biggest cost savings almost always come from top performance rather than lowest prices. If you use rubber products, remember B. F. Goodrich is one company that will *never* lower its quality standards. This means you can be sure of top performance and real money savings when you buy from your B. F. Goodrich distributor. *The B. F. Goodrich Company, Dept. M-407, Akron 18, Ohio.*

Grommet—T. M. The B. F. Goodrich Co.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

Protection Under ALL CONDITIONS of Grinding Operation

Protection requirements vary. That's why Allis-Chalmers control is recommended and applied with expert, personal attention to the specific problem at hand. For example, the starter illustrated is custom-engineered to control a 1000-hp, 2300-volt synchronous motor driving a ball mill. Its protection features not only meet regular operating requirements but also handle unusual emergency conditions. These features include:

- **Current-Limiting Fuses**
- **Thermal Overload Relays**
- **Squirrel-Cage Protective Relay**
- **Time-Delay Undervoltage Relay**
- **Polarized Field Application Relay**

For complete information, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Optional Features:

Exciter voltage relay to prevent starting when excitation voltage is not available; dc field failure relay to shut down motor on field current failure; instantaneous phase reversal and open phase; inching control for positioning mill.

A-4703

A-C ALLIS-CHALMERS

OVER 80 MILLION YEARS OLD!

Miles of America's future roads were laid up in this rock face some 80 million years ago. Today this natural asphaltic road material is being pulled out of the bank by a Northwest Model 6. This is one of the pits of the Kentucky Rock Asphalt Co. of Brownsville, Ky. The Northwest is a repeat order from this well-known producer of road material.

Like so many other installations in which you find Northwests, this digging isn't easy. But Northwests have proved themselves to be *real* Rock Shovels. They have the stamina for tough rock work. Cast Steel Machinery Bases and Side Frames take the shocks of rock digging. The Northwest Dual Independent Crowd utilizes force most independent crowds waste. The Cushion Clutch eliminates overloads before they can damage operating machinery. Uniform Pressure Swing Clutches take the jerks and grabs out of swinging. The "Feather-Touch" Clutch Control makes operation easy without resorting to delicate pumps, compressors and valves. These are just a few of the many advantages that combine to make the Northwest a *real* Rock Shovel—and remember, if you have a *real* Rock Shovel you never have to worry about output in any kind of digging.

Ask for full details.

NORTHWEST ENGINEERING COMPANY
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NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

Convertible for any Mining Material Handling or Excavation Problem

ROEBLING ANNOUNCES ITS NEW

Royal 1105 Blue

WIRE ROPE . . . 15% STRONGER THAN YESTERDAY'S GUARANTEED STRONGEST!

15% MORE STRENGTH is a whopping improvement. But translate that extra strength into terms of increased service life and you've really got something to brag about.

★ What's more, Roebling is pulling no punches on the variety of this new rope that will soon be available. You'll be able to get ROYAL BLUE Wire Rope in EVERY DIAMETER from ¼" to 3½" . . . in EVERY STANDARD CONSTRUCTION with an independent wire rope core.

★ In addition to new high strength, Roebling type 1105 wire — the finest high carbon rope wire ever produced — gives ROYAL BLUE Wire Rope amazing toughness and resistance to impact, crushing, abrasion and fatigue.

★ As the first step toward completely new service economy, write us for the whole story on ROYAL BLUE Wire Rope, or contact your distributor or nearest Roebling branch office.

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Subsidiary of The Colorado Fuel and Iron Corporation

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Now - out of Chrysler Corporation... come the most rugged trucks ever built!

Announcing new Dodge "Job-Rated" Trucks!

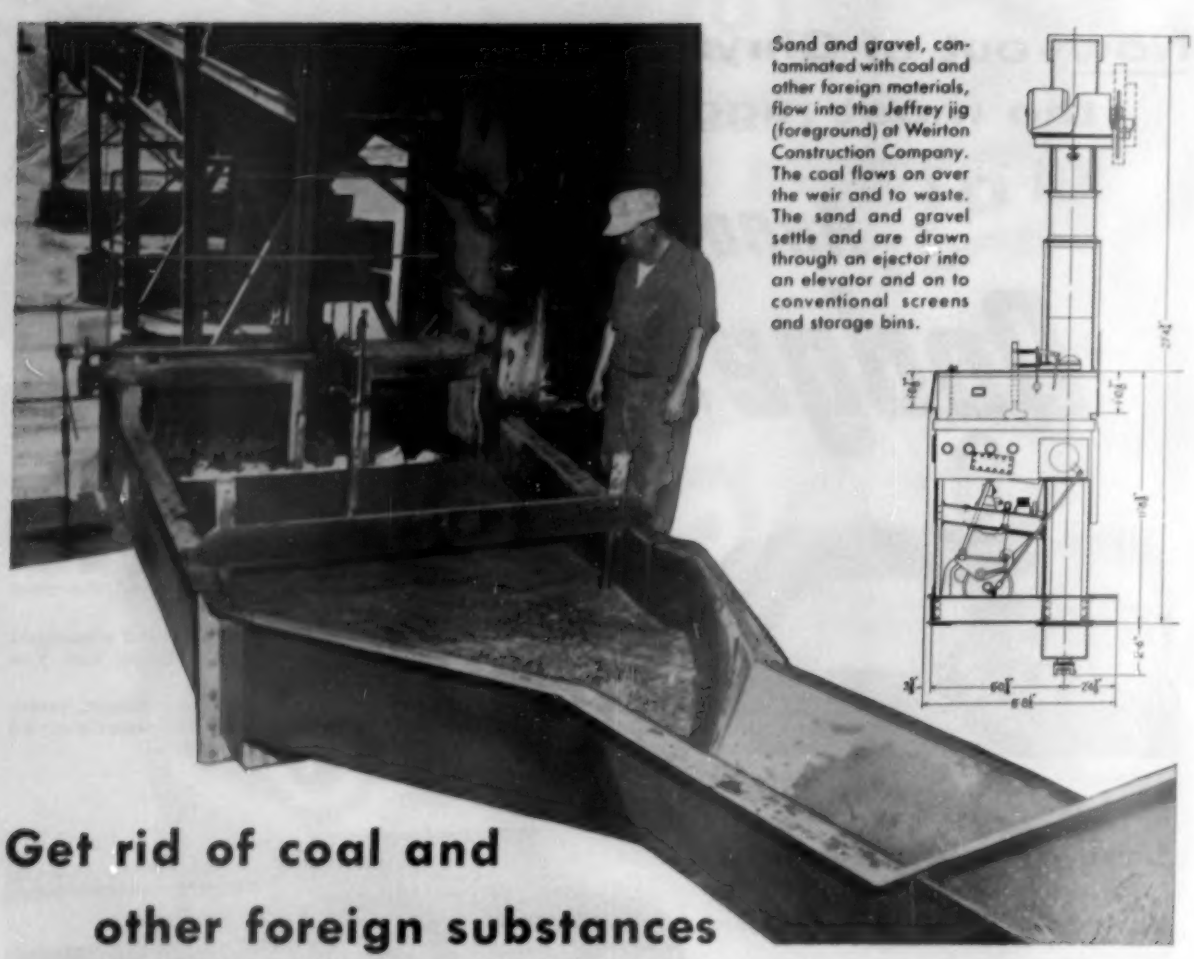
The **power line** with **full view** design!

NEW! Super Power-Dome V-8 engines—169 to 202 hp.—the world's most powerful low-tonnage V-8's—and the most dependable sixes!

NEW! Full-view design with biggest wrap-around windshield of any make! Wrap-around rear window available, too! You get greater safety, easier handling!

NEW! Higher payloads, new no-clutch transmissions, power steering and braking, fuel-saving overdrive! Plus smartly-styled interiors, colors, 2-toning! Over 100 new features!

Now on display at your dependable Dodge Truck dealer's!



Sand and gravel, contaminated with coal and other foreign materials, flow into the Jeffrey jig (foreground) at Weirton Construction Company. The coal flows on over the weir and to waste. The sand and gravel settle and are drawn through an ejector into an elevator and on to conventional screens and storage bins.

Get rid of coal and other foreign substances

Make your aggregate more marketable

Sand and gravel operators have a golden opportunity to increase production and profits with this *new* heavy-duty Sand and Gravel Jig.

It brings to the rock products industry the principle of cleaning with pulsating water, as made famous in Jeffrey Coal Washing Jigs. This jig removes coal, shale, clay, roots and sticks — producing sand and gravel of marketable grade at up to 75 TPH.

Weirton Construction Company has had two of these jigs in operation for several years. They report satisfactory performance with low maintenance and few delays.

Jeffrey laboratories are now conducting washing tests on many types of minerals. Our engineers are ready to consider *your* problem.

Write for Bulletin 893

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

"Mattresses" for the Mississippi

The Weymouth Construction Company of Memphis, Tennessee has the important job of casting concrete mattresses at the Helena, Arkansas casting field. Each year approximately 132,000 of these "mattresses," which require 110,000 cubic yards of concrete, are poured at the casting field. The mattresses are then picked up throughout the year and placed along the banks of the Mississippi River to help keep the mighty Mississippi flowing along its accustomed course.

Gulf lubricants and fuels are used exclusively by the Weymouth Company to keep equipment on this important operation performing smoothly and continuously. They have found that Gulf lubricants cut maintenance costs, and that Gulf fuels burn evenly and completely to insure top engine performance.

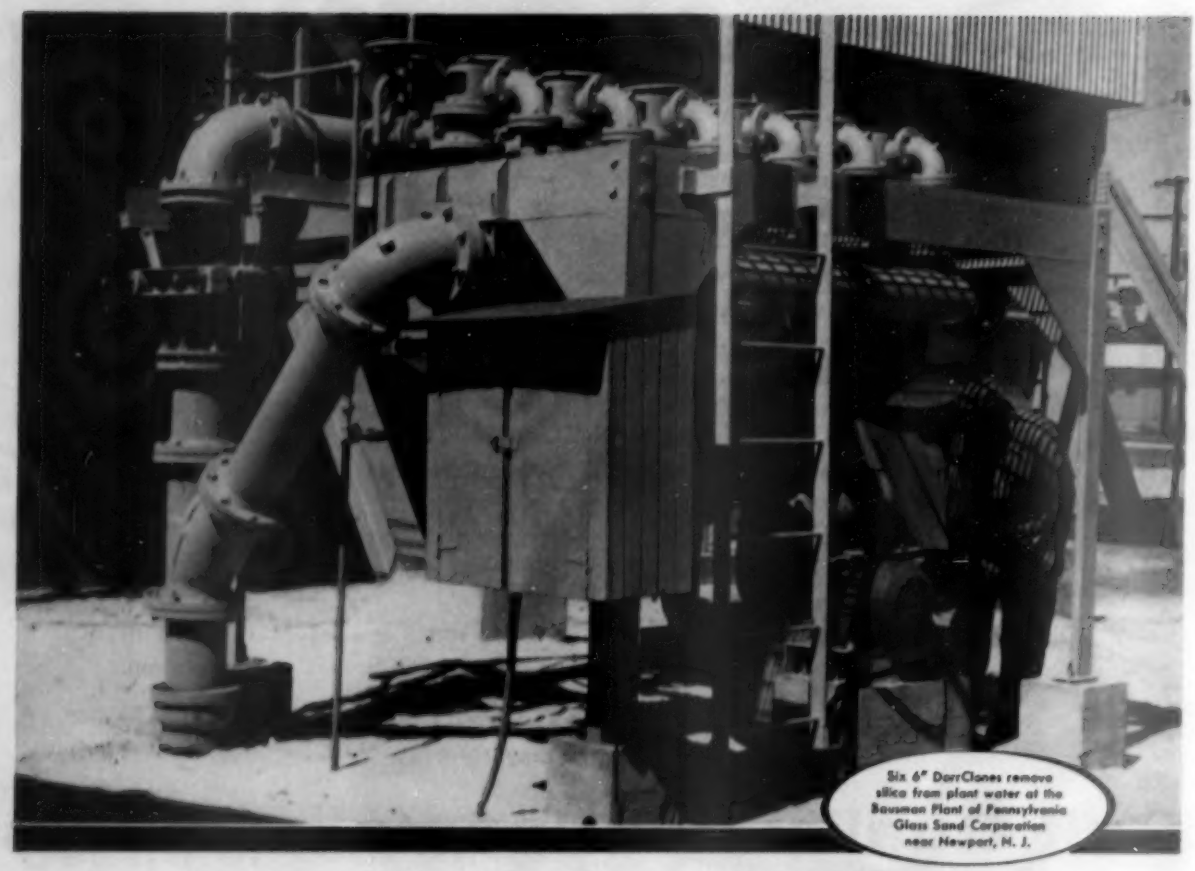
And they also appreciate Gulf's excellent engineering service, which helps insure the use of the right lubricant and fuels for each unit and climatic condition.

Contact your nearest Gulf office today and let us discuss with you how Gulf products and fine service can benefit your operation.

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pa.

Gulf Quality Lubricants and Fuels

... the finest for all your needs



Six 6" DorrClones remove silica from plant water at the Bausman Plant of Pennsylvania Glass Sand Corporation near Newport, N. J.

Pennsylvania Glass Sand Corp. Cleans Water Supply with **Six 6" DorrClones* Operating Under Hydrostatic Head...**

Operating Cost Negligible

An unusual operation . . . yes, because of the absence of a pump in operating a battery of six 6" rubber lined DorrClones which remove fine silica from waste water.

Here was the problem — Overflow from a 12 ft. wide classifier, dewatering 70 to 80 tons of silica per hour, was returned to a supply pond. Although this flow contained only 0.3% to 0.4% solids, continuous build-up of 12 to 15 tons of silica per day in the pond necessitated periodic dredging.

Here's how it was solved — Six DorrClones, each handling 100 gpm, were mounted side by side and manifolded to an 8" feed header. Operating pressure of 10-11 psi is supplied by hydrostatic head. This pressure differential is the result of the installation of the cyclone at ground level, roughly 30 ft. below the classifier. Flow is controlled to each unit by rubber pinch valves. Overflows discharge to the common header carrying cleaned water to the supply pond. Underflow is collected in a sump and pumped to the tailings dump. Recovery of 99.7% of the silica, discarded with plant tailings, prevents accumulation of solids to the water supply . . . reduces solids loading in the pond to 50 pounds per day. Operating costs of the 6 DorrClones are negligible because no power is required due to the available hydrostatic head, and low pressure operation minimizes wear.

We'd like to tell you more about how DorrClones can be used in your flowsheet. Just drop a line to Dorr-Oliver Incorporated, Stamford, Conn.

*Trademark Reg. U.S. Pat. Off.

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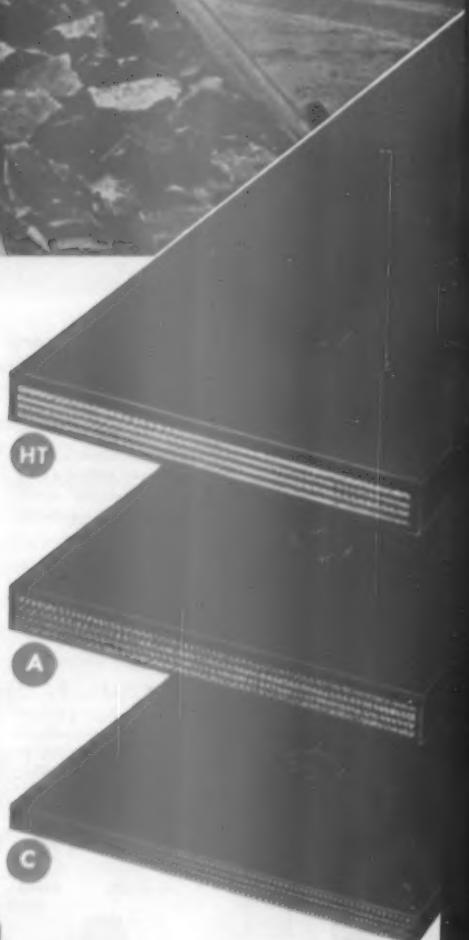
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Thermoid Conveyor Belting cuts handling costs in quarries

Thermoid
Industrial Rubber Products
Quality Service

There's a Thermoid Conveyor Belt designed to lower your handling costs on every quarry job. Here are three examples: HT For extremely abrasive materials such as granite, trap rock, flint rock, quartz ore; A For slag, lime rock, crushed stone and other highly abrasive materials; C For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. There is a complete line of Thermoid Conveyor Belting, Hose and Multi-V Belts for every quarrying application. Call your Thermoid Distributor for information, or write direct.



Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

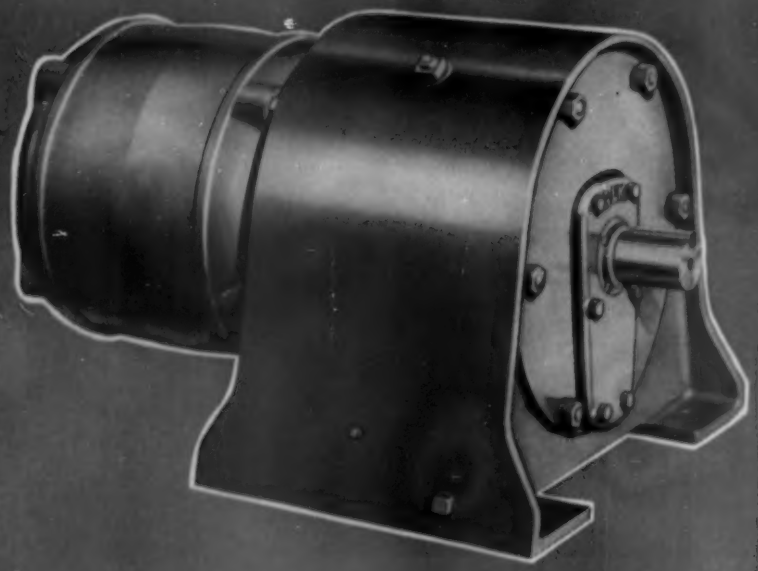
Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Announcing the *-Newly Designed-* Integral

ALL-STEEL FALK Motoreducer

(Gearmotor Type–Supplementing Falk All-Motor Line)

. . . with completely standard round-frame, D-flange motor



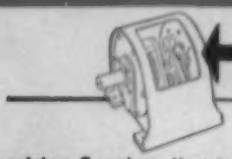
Check and Compare these features...

Meet a faithful old friend in a new, modern dress! The famous, time-proved Integral Type *all-steel* Falk Motoreducer (Supplementing Falk All-Motor Line) has been redesigned into a compact, streamlined unit providing the utmost in space economy—but retaining all the application versatility, long-life performance, easy-maintenance features and superior structural qualities that have made Falk Motoreducers the recognized standard throughout industry.

In this new Integral unit—rated in accordance with AGMA standards—a *completely standard* round-frame, D flange NEMA motor is mounted directly on the all-steel Motoreducer housing. The motor remains a separate piece of equipment, readily replaceable with any other type or make. Output speed (ratio) can be changed within unit's torque capacity without modifying motor. Size and arrangement of the standard housing permit wide ratio range—from 3.36:1 to 542:1.

In order to meet the greatest number of industrial application needs, the newly designed Integral Motoreducers are available in horizontal and vertical models, both in concentric and right-angle types; double, triple and quadruple reduction; horsepower range, 1 to 40 HP. Prompt stock shipment in standard ratios is offered.

Whatever your reduction requirements, you get greatest dollar-for-dollar value in the long run by standardizing on Falk products. Write for Bulletin 3104.



Every FALK Motoreducer has these "In-built" Factors—

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

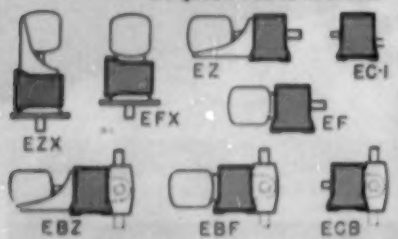
Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Sealed Housings. Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splash-proof, leakproof, dustproof.

EC

The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



FALK

...a good name in industry

THE FALK CORPORATION - 3001 W. Canal St. - Milwaukee 8, Wis.

WRITE FOR BULLETIN 3104

Faster, more power,
and LOOK, NO CLUTCH!

It's a pleasure to work here!

1. **Power-shift levers:** for Forward-Reverse and High-Low; make any shift while moving in either direction.
2. **That's no clutch!** It's a double-pedal brake, use it with either foot.
3. **Break-out bucket lever:** work the bucket in the pile—you've got two big double-acting bucket cylinders for tremendous breakout power, independent low-level tip back.
4. **Range Shift:** working or travel speed
5. **Drive Selector:** 4-wheel and 2-wheel
6. **Boom Control**

Until you see a MICHIGAN in action, you won't believe that it's possible to deliver so much power with such ease of operation. Your driver stays at peak efficiency all day long because there's no conventional clutch on a MICHIGAN. Instead, the MICHIGAN's exclusive power-shift transmission does all the shifting hydraulically—and eliminates the most notorious cause of excessive maintenance and driver fatigue.

In addition to effortless, instantaneous shifting, you get up to 300% torque multiplication on a MICHIGAN—from the Clark-built converter. With this kind of smooth, shockless power transmission, you get the full advantage of the MICHIGAN's extra weight and higher horsepower.

A demonstration (on your own job, if you wish) is the only way to get a real understanding of what this machine can do! Just write or call us—and don't forget that all MICHIGAN's are available on the low-cost MICHIGAN Lease Plan.

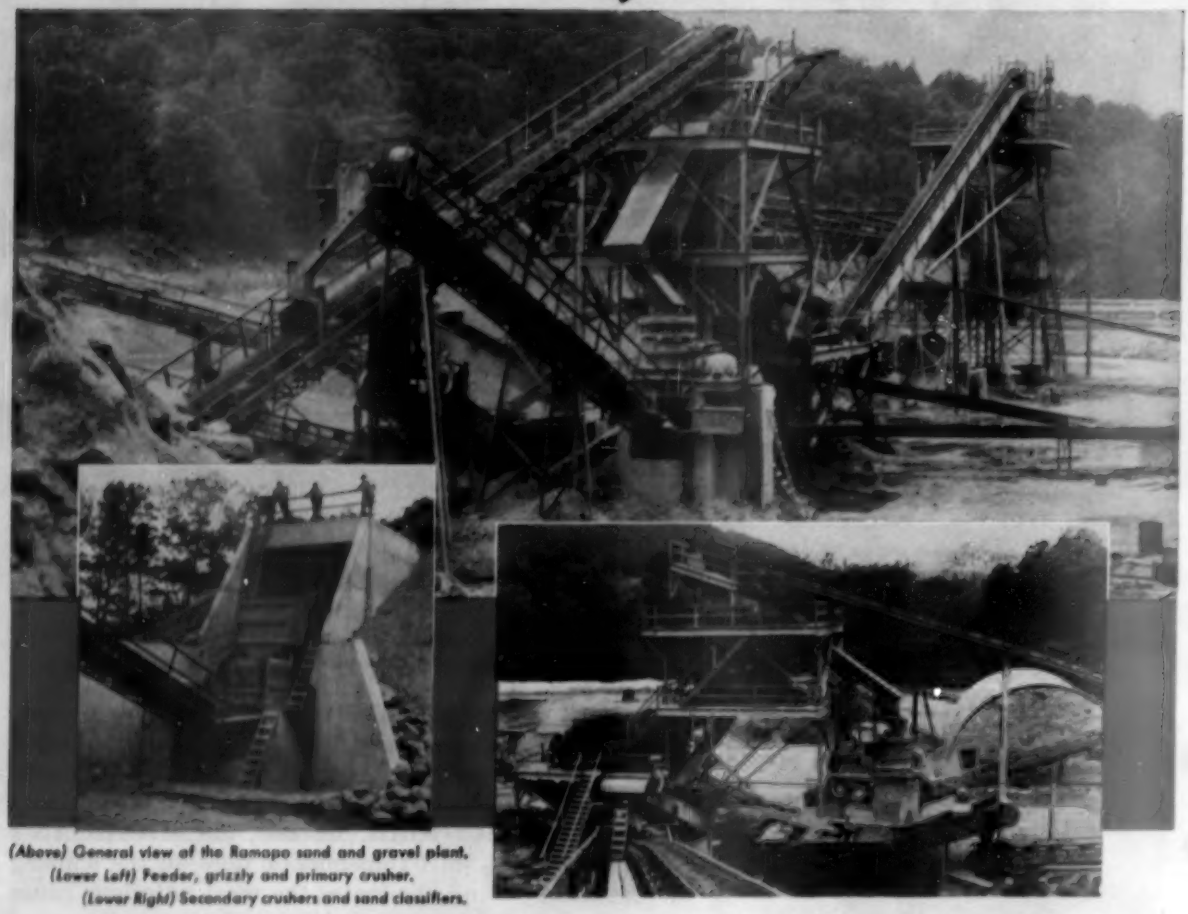
CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
452 Second St., Benton Harbor 28, Michigan
Phone: WA 6-6184

for heavy construction programs

COMPLETE TELSMITH PLANT

meets all requirements



(Above) General view of the Ramapo sand and gravel plant. *(Lower Left)* Feeder, grizzly and primary crusher. *(Lower Right)* Secondary crushers and sand classifiers.

Near the New York Thruway, and close to many other heavy construction jobs, this complete Telsmith plant meets all their aggregate requirements. Built by Ramapo Sand & Gravel Co., Ramapo, N. Y. and designed by Telsmith engineers, it has Telsmith equipment throughout. It makes three sizes of gravel, and concrete and mason sand, all washed. Be sure that yours is a profitable Telsmith plant. Send for Bulletin 266.

ALL Plant Equipment is TELSMITH

36″ x 6′ Heavy-Duty Plate Feeder • No. 540 Rotary Grizzly • 18″ x 30″ Jaw Crusher • 36-S and 367-S Gyrasphere Crushers • 5′ x 14′ Double Deck Scalper Dry Screen • 5′ x 14′ Double Deck Vibro-King Wet Screen • 60″ x 18′ Rotary Washing Screen • Two 4′ x 12′ Triple Deck Vibro-King Finishing Screens • 24″ x 20′ Twin Screw Sand Classifier • 30″ x 25′ Twin Screw Sand Classifier • Eight Telsmith-BG Belt Conveyors: 30″, 24″, 18″ wide, total length 892′.

G-24

SMITH ENGINEERING WORKS

508 E. CAPITOL DRIVE **MILWAUKEE 1, WISCONSIN**

Representatives in Principal Cities in All Parts of the World • Cable Address: Sengworks, Milwaukee

ACROSS HILLS AND VALLEYS

Explosives Research Pays Off

Blasting trenches in hard granite formations to install a pipeline in Southern California called for engineering skill, operating know-how, and a knowledge of explosives.

Over hills and valleys and across rivers and gorges, pipelines provide safe, sure, economical means of transportation for petroleum, natural gas, water, and other mineral resources. When rock is encountered, blasting crews with specialized explosives take over. Here is where explosives research pays off.

Continuous research and extensive knowledge of field conditions have been Hercules' business for more than forty years. Hercules technical representatives welcome opportunities to discuss problems and help in the selection of the right explosives and the most efficient methods for use in mining, quarrying, construction, and exploration projects.

HERCULES

HERCULES POWDER COMPANY

Explosives Department, 946 King Street, Wilmington 99, Delaware

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazelton, Pa.; Joplin, Mo.; Los Angeles, Calif.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Calif.

To meet the stepped-up needs of industry . . .

ALLIS-CHALMERS PRESENTS TWO

ALLIS-CHALMERS

TS-360

280 HP

15-YD CAPACITY, STRUCK

20-YD CAPACITY, HEAPED

NEW BIG-YARDAGE WORK CAPACITY!

Power that pays

The TS-360's great new Allis-Chalmers engine spearheads a whole new power train that offers more rim pull at lower speeds for better loading, hauling and spreading performance; faster acceleration, easy shifting and quick getaways. Combined with new 20-yd capacity, this all adds up to fast, high-volume, high-profit work cycles.

New operating ease and safety

In addition to big-job power and gearing, the TS-360 Motor Scraper offers everything an operator needs to work easily, yet efficiently . . . new Double-Safety air brakes, new selective steering, direct electric starting, new multiple-disc cable control . . . and many others you'll want to know more about.

Strength to back it up!

The new TS-360 is built around a new, all-welded, heavy steel main frame that makes possible the service accessibility of unit construction. What's more, there's an all-new final-drive gear train, with new gears, shafts and bearings. These and many other advantages mean more work done, lower maintenance cost and longer equipment life.

Nowhere can you match these two in the amount of work they do!

... for more power—better performance—longer life ...

NEW, POWERFUL DIRT MOVERS

ALLIS-CHALMERS

HD-21

204 NET ENGINE HP

44,000 LB

BIGGEST, MOST POWERFUL CRAWLER IN PRODUCTION ... ANYWHERE!

New standards of output

The HD-21 introduces the new Allis-Chalmers engine and a great new power transmission team. Together, they provide extra speed with any load, extra pulling power at any speed . . . wider speed ranges and more range overlap. And with its advanced design torque converter (*the result of 15 years of leadership by Allis-Chalmers*) the HD-21 puts its power to work with less shifting than ever before possible . . . to help you reach a new high in efficient, profitable production!

New standards of durability

From the new Allis-Chalmers diesel with "follow-through" combustion to new, heavier Tru-Dimension track, the HD-21 is built to take today's big loads in stride, and come back for more. Here are just a few more of the long-life features you can't get from anyone but Allis-Chalmers . . . at any price: all-steel Box-A main frame, straddle-mounted final-drive gears, 1,000-hour truck wheel lubrication, oil-enclosed track release mechanism.

New low cost per unit of work

The HD-21 offers 20 percent greater over-all performance . . . provides a new measure of tractor value. Add the *planned* approach to service offered by Allis-Chalmers dealers, and it's the ideal team for men tackling today's big jobs.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

If you're a big contractor who wants a slice of profitable commercial work . . .

If you're a new operator who wants to be sure of beating competition . . .

TEAM UP these two low-cost Cedarapids plants

Here's a team that can't be beat for making yourself a nice slice of profit on small to middlin' jobs . . . the ones that can be a profitable sideline for established outfits. . . or which are sure-fire money-makers to give new operators a flying start in the business.

Your investment is low and your "take-home" is sizeable, because each unit is low in price but high on production. Teamed up, they keep you on top of the job, from gravel, pit or quarry to bituminous surfacing.

SINGLE PASS CRUSHING PLANT

The Single Pass Plant shown above produced 40 tons per hour of ¾" rock and gravel, 60 tons per hour of 1", and from 67 to 90 tons per hour of 1½" aggregate. That's the kind of production that lets small operators as well as big outfits make money on road maintenance work, city streets and alleys, small State contracts, base or blanket course jobs, and other jobs where portability and fast set-up are important.

The Cedarapids Single Pass is the most practical plant of this type available. It has plenty of screening capacity, and the hopper and feeder *on the rear end* let you back right up to the nearest gravel bank and start producing *two sizes* of material immediately. Simple design, with few moving parts, keeps maintenance costs low.

Model CM "COMMERCIAL" BITUMINOUS MIXING PLANT

Rated at 40 tons per hour, this Model CM "Commercial" Plant averaged 45 tons per hour! The peak production on the job was recorded at *47 tons per hour!* With this kind of output, Model CM owners are turning a tidy profit on jobs such as surfacing city streets, driveways, parking lots, playgrounds and other commercial type work.

The Model CM twin shaft mixing unit can be used alone to produce cold mix, or combined with a 4816 "Packaged" Drier for turning out hot mix or high type bituminous concrete. The use of a Model CGC Gradation Control Unit assures meeting strict State specifications accurately. Addition of a Model BH Feeder completes the set-up for highly profitable operations.

IOWA
MANUFACTURING COMPANY
Cedar Rapids, Iowa, U.S.A.

FOR YOUR BIG JOBS BUY THESE CEDARAPIDS PLANTS

Double Impeller Impact Breaker

Hammermill Secondary and Portable Double Impeller Primary

Model C60 6000-lb. Bituminous Mixing Plant

COMPLETELY ASSEMBLED
FACTORY ADJUSTED
PRE-LUBRICATED

SEALED

—ready to mount on the shaft!

DODGE-TIMKEN *America's Quality Pillow Block*

Extra measures are taken to build superior quality into Dodge-Timken Bearings; and extra precautions are taken to keep that quality *intact*—from the factory to distributor to you to your machines.

These bearings are sealed in manufacture—an integral part of Dodge-Timken design. Their inbuilt precision is protected *both on and off the shaft.* That is one reason why they easily deliver a minimum of 30,000 hours of service. Want evidence? Look around you. No other pillow block is so widely used on the nation's tough jobs. Dodge-Timken dependability has been proved in *millions* of installations.

There are 5 types of Dodge-Timken Pillow Blocks for all types of service, in shaft sizes from 1 3/16" to 10". Also Dodge-Timken Hanger Bearings, Flange Bearings, Take-ups.

DODGE MANUFACTURING CORPORATION, 2600 Union St., Mishawaka, Indiana

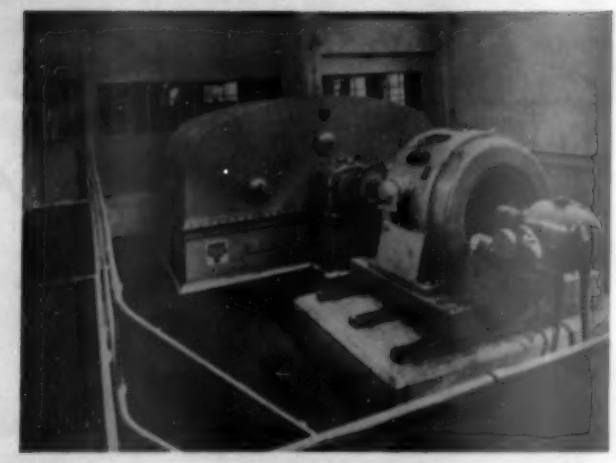
DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

Years of continuous, reliable performance at highest efficiency and negligible maintenance.

Over 7500 HP transmitted through Symetro gears direct to trunnions of raw mills in cement plant illustrated above.



Driving station for large clinker mill showing motor and Symetro gear in separate enclosure (right).

For Smidth Machinery apply to:

F. L. Smidth & Co., A/S
Vestergade 33,
Copenhagen K, Denmark

F. L. Smidth & Co.
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co., Ltd.,
105, Piccadilly,
London, W. 1, England

F. L. Smidth & Cie France
80 Rue Taitbout
Paris (9e) France

F. L. Smidth & Co. of Canada, Ltd.
11 West 42nd Street
New York 36, N. Y.

F. L. Smidth & Co. (Bombay) Ltd.
42 Queen's Road
Bombay, India

What's Happening

IN OTHER FIELDS OF INTEREST TO THE ROCK PRODUCTS INDUSTRY

May, 1955

Guaranteed Annual Wage under Walter Reuther's "G.A.W." plan might mean that no one has to work except the white-collar guys who write checks and keep the books. At a school conducted in Detroit to educate the stewards of the United Automobile-workers Union, the following questions and answers were reported to have been given: "Is this plan based on a full week's pay?" asked one student. "It is." "Does that mean if I'm grossing $80 a week, and I'm laid off, I'm entitled to $30 unemployment compensation, and the company pays me $50?" "That's right. And the $30 is income tax free." "So I'd be ahead of the guy working, who has to pay income tax on the whole thing." "Correct." "Sounds good to me," said the student, and sat down.

A mixture of 80 percent powdered steel and 20 percent plastic, known as "Devcon," has been developed by Chemical Development Corp., of Danvers, Mass. The cold-setting resin is said to be as pliable as putty, yet hardens within two hours to a rigid, steel-like mass, without the need for heat or pressure. It is claimed to cement together parts of steel, aluminum, bronze, brass, cast iron and porcelain, and has been used for forming molds or dies, fill holes in castings, to build up metal parts, and patch engines. It is not recommended for use at more than 300 deg. F., although the firm is working on a heat-resistant variety.

More people expect to buy homes in 1955 than in any year since 1948, according to the Federal Reserve Board's annual report on consumer buying plans. More are also expected to improve their homes than did in recent years. Percentagewise, about 9.6 percent of consumers planned to buy or build nonfarm houses in 1955, which is a larger percentage than in such housing boom years as 1950, with 8.4 percent; 1943, with 8.8 percent; and 1954, with 6.6 percent.

One hundred 70-ton covered hopper cars are being built by Greenville Steel Car Co. for Western Maryland Railway Co., Baltimore, Md. The cars will be used to haul bulk cement and other construction supplies to meet the increased activity in highway construction. The cars, with a capacity of 2003 cu. ft., have four discharge hoppers and eight circular-type loading hatches.

Heavy construction awards, nationally, totaled $4,367,025,000 for the first 13 weeks of 1955, or 56 percent higher than in 1954, and 8 percent above the previous high in 1953, as reported by **Engineering News-Record.** Private construction awards totaled $1.7 billion for the 13 week period of 1955, 111 percent higher than the previous record in 1953.

Zonolite Co. has established a one-year, $1500, graduate fellowship at Clemson College, Clemson, S. C. Initial study will be based on the relation of physical and chemical properties of vermiculite to its geological origin.

WHAT'S HAPPENING

Experimental sections of road surfacing containing rubber have been laid on selected roads throughout the country, including Connecticut, Louisiana, Nebraska, Ohio, Utah and Wisconsin. Formerly, the rubber was mixed with the bituminous material at a chemical plant and shipped "hot" by truck or rail to the construction site, limiting shipping range and adding considerably to the cost. Now, rubber pellets no larger than a pencil eraser are packed in bags and delivered to a plant near the construction site, cutting shipping costs and distance restrictions.

A bill raising the maximum fine for violations of the Sherman Antitrust Act from $5000 to $50,000 has passed the House, and is now before the Senate. The present penalty of $5000 has been the same for the past 65 years, since the Sherman Act was passed, and the Judiciary Committee noted that penalties are so low that "violation is regarded by businessmen as a good business risk." The bill would not change the present one year maximum jail sentence. Both the fine and jail maximums apply to each count of a conviction.

The trucking industry in the United States has doubled its fleet of trucks from 1944 to 1954, according to the annual Trends report of the American Trucking Associations, Inc. The number of trucks in operation increased from 4,513,000 in 1944 to 9,447,000 in 1954, exclusive of 413,239 government-owned vehicles, or nearly half the world total of 19,818,000. According to the report, trucks, which represent 17 percent of all vehicles, paid 33 percent of state highway user taxes.

A tax bill, placing two mills on every ton of limestone, dolomite, sand, gravel, and other minerals was killed in the Missouri Legislature recently, after having been brought up for the third time. The House Committee on Mines and Mine Inspection held that the industry's safety program, and the rigid requirements of insurance carriers, eliminated the need for government inspection.

An effort is being made to minimize rehandling of limestone in kiln feeding at the Electro-Metallurgical Division of Union Carbon and Carbide Corp., New York, N. Y., as reported in **Limeographs.** The firm has estimated that every time limestone is handled there is a resultant increase in limestone fines averaging 1 percent by weight of the total limestone involved.

Vibrations from a machine used to shake railroad cars to empty them of sand at Fort Myers Ready Mix Concrete Co., Fort Myers, Fla., are said to have caused cracks in walls of a nearby building. The company, in an effort to change the vibration cycle, stated it would change pulleys on the vibrator, and as a second resort, change the position of the machine.

Concrete block equipment was recently flown by Pan American World Airways to Dr. Raoul Pichardo at Havana. The machinery included a 21,341-lb. block machine with a capacity of 3000 block per 8 hr.; a 3000-lb. concrete mixer; and over 100 molds.

THE EDITORS

GAS AND OIL . . . FROM BRICK When you say: "Fill 'er up", you're putting brick to work. Refractory brick. For once crude oil is pumped from the well, every process in making petroleum products depends on heat that only refractory lined furnaces can handle.

Practically everything you buy or use, everything that's made or moved, is dependent on refractories. The steel in your car, the glass in your windshield, the rubber in your tires, and the "blacktop" of your drive.

When you consider the enormous variety of industry, and the infinity of processes, you get some inkling of the tremendous technology and scientific reservoir that General Refractories draws on to produce refractories of highest efficiency and utility for specialized needs.

Company-owned sources half a world away pour in materials, all subject to the most exacting analyses and tests in the world's finest refractories laboratory, where new and finer products are constantly evolving.

With 66 mines and manufacturing plants, strategically located sales offices and warehouses, Grefco truly provides a complete refractories service.

GENERAL REFRACTORIES COMPANY
PHILADELPHIA 2

GENERAL REFRACTORIES

A COMPLETE REFRACTORY SERVICE

STEELKLAD basic kiln liner permanently jacketed in a patented steel shell with special marking. See that notch? Assures correct installation.

ARCO-70 is a high alumina fireclay brick of the 70% alumina classification. Ideally suited for use in cement kilns.

Announcing **A *New* TYPE HMS SEPARATORY VESSEL**

Send for Information on Complete Pilot Plant Demonstration and Testing Services

'OCC' VESSEL INTRODUCES UNPRECEDENTED SIMPLICITY

The new OCC vessel represents the successful realization of the main advantage of the HMS process:—its utter simplicity. The simplicity and efficiency of the OCC vessel are shown by these 6 noteworthy features:—

- **High separating efficiency.**
- **Low operating, maintenance costs.**
- **No rotating parts in the medium.**
- **Open vessel; separation visible.**
- **Quiet pool; no adverse turbulence.**
- **Quickly adjustable rake speed.**

Complete HMS testing, plant designing and installation services.

THE ORE & CHEMICAL CORPORATION

. . . . . *Division: Mining & Milling Machinery* . . . . . .

80 BROAD STREET, NEW YORK 4, N. Y.

They're drilling Limestone for NEXT-TO-NOTHING A YARD...

...with this JOY "Blastair Drill"

In a Texas limestone quarry, a Joy Model 225 "Blastair" Drill set the following performance record . . . with a drilling cost of *less than two cents a cubic yard:*

Bit Size		6¼"
Footage Per Shift		300
Labor Cost Per Shift (Driller & Helper)	$20.80	
Fuel Cost Per Shift	5.00	
Lubricating Oil Cost Per Shift	2.00	
Total Labor & Fuel Cost Per Shift		$27.80
Labor & Fuel Cost Per Foot	$ .093	
Bit Cost Per Foot	.134	
Total Labor, Fuel, Bit Cost Per Foot		.227
Cubic Yards Broken Per Foot		13
Total Drilling Costs Per Cubic Yard		.0174

Performance figures will vary, of course, with other formations. However, they show the possibilities of cutting *your* drilling costs with this outstanding Joy drill.

The "Blastair" is a truck-mounted, rotary, "air-blast" drill. It is a fast mover between holes and is easy to set up in drilling position. Its outstanding features include hydraulic automatic chuck, heavy-duty hoisting drum, oil-bath chain-case power unit, and rugged sectional mast. It is a real top-performance, low-maintenance machine that is ideal for the rough jobs of quarry and open-cut mine drilling.

Find out for yourself how the Joy "Blastair" can cut drilling costs on your job as it did this. Write today for Bulletin RM-709 to *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

GASOLINE OR DIESEL DRIVE • 6¼" MAX. DIA. HOLE
20' FEED • DRAG OR ROTARY-CONE TYPE BITS

Consult a Joy Engineer

OR WRITE FOR BULLETIN RM-709

W&O M5585

JOY

PIONEER AND WORLD'S LARGEST MANUFACTURER OF ROTARY BLAST HOLE DRILLS

for "Manufacturing" Sand

★ **PRODUCES SPECIFICATION SAND**

★ **EXTENDS LIFE OF NATURAL DEPOSITS**

An Allis-Chalmers rod mill converts stock piles of unsalable material into *specification* sand. It prolongs the productivity of natural reserves. It produces specification sand in areas where natural sands are unusable, thus eliminating transportation expense and inconvenience.

Rod Mill Advantages — Processing specification sand from rock, coarse aggregate and natural sand is a particularly abrasive and difficult job. That's why Allis-Chalmers rod mills are so well suited for the job. Basically the A-C rod mill is a simple, rugged machine . . . a grinding mill that requires little attention yet provides continuous, dependable performance. Replacing worn grinding media is merely a matter of inserting a couple of rods. Mill liners are easily replaced.

Produces Cubical Product — Rod mill action breaks long, flat particles and knocks rough corners off other particles. This results in a desired cubical product . . . a product that has a definite effect on concrete strength and the amount of cement required.

Affords Specification Flexibility — You can meet varying specifications with an Allis-Chalmers rod mill by changing the rod charge, feed and feed water. Once mill is adjusted to produce a required product, it needs very little attention.

For complete information on Allis-Chalmers rod mills, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B6718A.

A-4658

ALLIS-CHALMERS

Crushing Life Increased 500% by Hard-Facing with HAYNES 90 rod

Hard-facing the rolls in this crusher rig with HAYNES 90 Rod makes them more than 5 times more durable. Two sets of rolls are used to crush rock from 3-in. down to ½-in. screen size. They handle up to 26 thousand tons of rock with a minimum of repairs—despite severe wear from abrasion and impact. Other hard-facing materials wore out before 5,000 tons of rock were crushed.

Since HAYNES 90 Rod was adopted as the standard material on this job, production increased, down-time was reduced, labor and maintenance costs were cut, and less hard-facing material was needed per ton of rock crushed. This is typical of the kind of savings that can be realized by hard-facing with HAYNES alloys.

HAYNES hard-facing alloys give outstanding service when used to protect parts in crushers, shovels, tractors, trucks, conveyors, and other metal parts exposed to wear from abrasion, impact, corrosion, or heat.

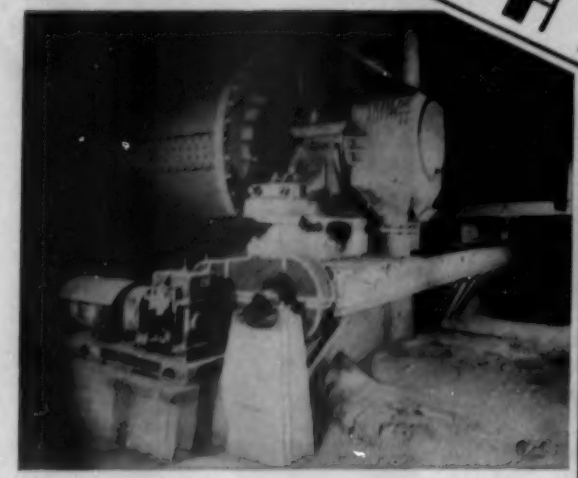
Your local dealer carries a complete line of HAYNES hard-facing alloys, including: HAYNES iron and nickel-base rods, HAYNES STELLITE cobalt-base rods, and HAYSTELLITE tungsten carbide tube rods. Ask him for descriptive literature. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

See... Your local Haynes Stellite Dealer

or

Write... to Haynes Stellite Company

"Haynes," "Haynes Stellite," "Haystellite" are registered trade-marks of Union Carbide and Carbon Corporation.



F-H AIRSLIDE®

BEFORE AND AFTER

. . . pictures tell the true story

The same operation, before and after changeover to Airslides, handling a dry, pulverized product from two tube mills (one in background not shown).

The view on the left shows how material was conveyed from the mills by a 12-inch screw conveyor, driven through a speed reducer, sprocket and chain, by a 5-hp. motor. Result—dusty and noisy, excessive power cost, lubrication, wear, hazardous moving parts . . . the ever present possibility of breakdowns of the mechanical parts, with resultant shutdown for repairs or replacements, with consequent costly down-time and labor charges.

The view on the right shows how the material is now handled with two 8-inch Airslides. Result—elimination of dust, noise, lubrication, wear, and hazardous moving parts. Also note more open floor space obtainable. Power (air for fluidizing of material being conveyed by the Airslide) approximately one-eighth horsepower for the two Airslides.

In addition to the advantages mentioned, there are many others . . . especially noteworthy is the fact that they permit economy and convenience in location of buildings and production equipment without the restrictions or straight-line limitations of mechanical conveyors. Write for Bulletin *FH-2*, The F-H Airslide.

Fuller Company is the exclusive manufacturer of air gravity conveyors, except for use in motor vehicles, under Huron Portland Cement Company U. S. Patent Nos. 2,316,814—2,517,837 — 2,527,394 — 2,527,455 — 2,527,466 — 2,527,488 —2,589,908, and Patents Pending.

VISIT BOOTH 1971
NATIONAL MATERIALS HANDLING
EXPOSITION
CHICAGO, MAY 16-20

FH-35

DRY MATERIAL CONVEYING SYSTEMS
AND COOLERS—COMPRESSORS
AND VACUUM PUMPS—FEEDERS
AND ASSOCIATED EQUIPMENT

Fuller

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St.—Chicago 3
420 Chancery Bldg.—San Francisco 4

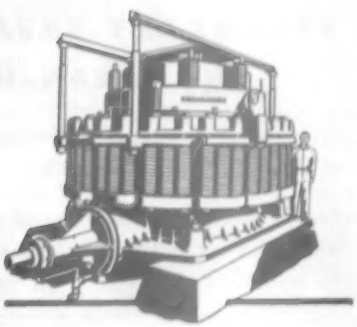
Rarer Elements now serve the Men of Science

☆ As man crashes through the sound barrier, we find new words being used to describe the miracles wrought by today's men of science and research . . . words like *electronics—guided missiles—nuclear fission—transistors.*

Helping to make these scientific advances possible are the technical skills and vast experience of the mining industry, now being utilized to develop the rarer elements. Rocks and minerals formerly of no commercial interest have thus come into production . . . including *aplite, nepheline, syenite, olivine, perlite, pinite, topaz,* and many more.

Uses of these elements are numerous—ranging from modern construction to radar, sonar, and jet aircraft parts . . . but most of them have one thing in common . . . they are being processed by SYMONS® Cone Crushers—*the machines that revolutionized crushing practice.*

NORDBERG MFG. CO., MILWAUKEE, WIS.



SYMONS Cone Crushers are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

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NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

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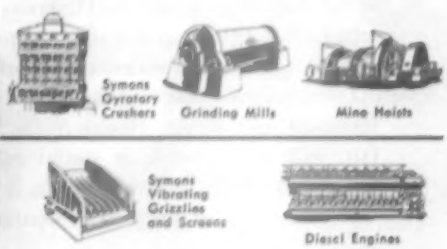
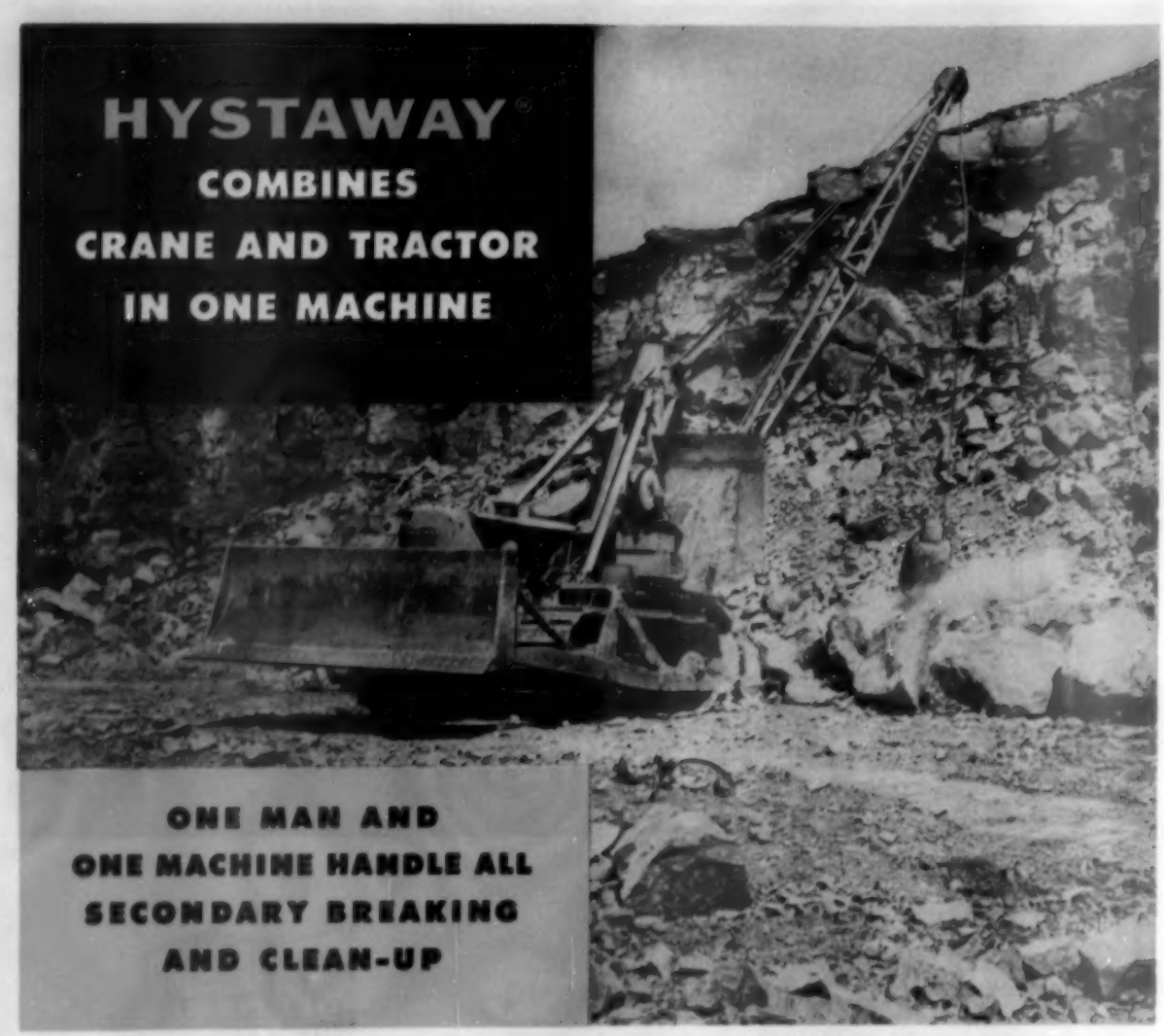
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG



HYSTAWAY®
COMBINES CRANE AND TRACTOR IN ONE MACHINE



ONE MAN AND ONE MACHINE HANDLE ALL SECONDARY BREAKING AND CLEAN-UP

Mount a Hystaway on a new or used Caterpillar-diesel Tractor and you get a hard-working piece of equipment that allows one operator and one machine to do a job usually handled by two separate machines (crane and bulldozer).

Using a drop ball and crane boom, Hystaway performs all secondary breaking *plus* clean-up work —keeps busy all day every day.

Handy machine for maintenance work—able to travel at tractor speeds, the Hystaway also handles jobs such as lifting screens and motors on crusher repairs, building and maintaining haul roads.

Quickly convertible to dragline, shovel, backhoe, clamshell, pile driver, Hystaway can be mounted fast, without alteration or special equipment, on Caterpillar D6, D7, or D8 Tractors.

If you are now using two separate machines (crane and bulldozer) to handle secondary breaking and clean-up, it will pay you to investigate the savings in operating costs made possible by the Hystaway-Tractor combination.

See your Caterpillar-Hyster dealer for details, or write direct to Hyster Company, 2918 N. E. Clackamas Street, Portland, Oregon, or 1818 N. Adams Street, Peoria 1, Illinois.

HYSTER COMPANY

"Matched Design" Tractor Equipment for All Industries

EDITOR'S PAGE

Company Publications Have Great Potential Value

AMERICAN BUSINESS is spending more than one hundred million dollars a year to put out company magazines to serve many purposes. The expenditure for such publications has continued sharply upward even through the last year or two when competition has tightened and management has grown highly cost-conscious.

There are many kinds of company magazines and they range from single-sheets to elaborate, well illustrated publications that require great editorial skill in their preparation. Some of them are edited entirely for plant employes and their families while others are largely designed for distribution to company salesmen, to dealers and for users and potential customers.

There are relatively few company magazines published in the rock products and concrete products industries but some of them by larger concerns compare favorably with those of big American industries and they are doing a good job.

Value of Publications

While elaborate house magazines cannot be afforded by the majority in the rock products industries it seems that almost any size of operation can at least get out some form of monthly sheet that will accomplish much that is gained from the larger big-company magazines. Such sheets could be patterned along similar lines and be made profitable.

If the purpose be to improve employe morale, objections of employes to mechanization could be overcome by slanting articles to show how employes benefit because such capital investment has made it possible to increase volume of business and to get sales that otherwise would be lost to competition.

Such articles might also be highly educational, in showing workers how new equipment will benefit the quality of product and make their jobs more secure as well as pleasant. Publicizing plant improvements should, of course, be given wider coverage than that for the benefits that will result by having an informed local community.

Company magazines are proving very effective in the conduct of accident prevention programs, in the pushing of sales contests, in the promotion of employe suggestion systems and in telling employes various aspects of their jobs.

The larger companies can prove their returns from such magazine programs and there is no reason why smaller companies cannot gain part of such benefits. For example, a large manufacturer's publication, used to foster an employe suggestion system, has yielded savings resulting from suggestions worth six times the amount paid for employe's ideas.

There are instances where company magazines, devoted to the improvement of accident records, have been so effective in their goals that the safety program has been assigned entirely to the publications. Reductions in insurance rates through improvement of the record have far more than justified cost of such publications.

Part in Sales

Where sales are the objective of publications, many of them are proven to be valuable sales stimulators. They may give tips to dealers, provide lead sources to salesmen and serve as "in between" sales contacts where it is impossible for personal calls to be made as frequently as desirable.

A concrete block company of average size in a small midwestern town has the size and kind of monthly publication that almost any producer could afford and which is effective in a selling territory constantly combed by competitors. The publication is a four page, small sized news sheet reproduced in two colors to make it have appeal and it costs fifteen cents a copy to produce. Circulation is to customers and prospective customers, bankers, architects, engineers, public officials and all others who might have interest in construction and concrete masonry.

Publication was started when it was learned by management that few people knew of the company's business and because it was found that prospective customers were interested in what the company produces and how it makes its product.

An early issue covered the company, its plant, facilities for quality control, and contained a written invitation to inspect the plant. Subsequent numbers have given more prominence to activities of architects, engineers and contractors in the area, with photographs of completed jobs, and always contain timely news about local jobs to come and on the subject of construction generally. The paper has served to sustain interest in the company's products between sales calls and at very modest cost.

Almost any size of operation could at least get out a monthly sheet for employes, letting them know about orders to be filled, how orders were gotten and bringing out how necessary loyal cooperation on the part of employes is to stay in business. That would be an excellent way to build up employe morale.

These industries could accomplish much through the printed page.

Bror Nordberg

Deep Stuff on Geochemistry

ROCKY'S NOTES

NATHAN C. ROCKWOOD

NOT SO LONG AGO probably most of our readers thought we were going off the deep end when we delved into structural chemistry — the physical structures of certain atoms and molecules. We did it because it was believed that there can be no real solutions to the ever-recurrent problems of cement and concrete durability until something is known about the chemical structures of the particles involved. Hence we tried to present a few of elemental concepts of structural chemistry. We think our judgment has been vindicated by reports on recent research work on cement, or at least research on the most important ingredients in portland cement — the hydrated calcium silicates. As noted in our review of the new edition of Dr. Bogue's book "The Chemistry of Cement" in the April issue, researchers are about ready to accept a structural chemical formula for this fundamental "silicate ion."

There is still a long way to go before we shall know how the other particles in hydrated cement and in concrete fit into the composite chemical and physical structure, and what type of chemical and physical bonding is in various parts of the structure. Nevertheless, researchers are now approaching these problems in the only manner in which the inconsistencies encountered in the thousands of published experimental results will ever be accounted for. Hence, we believe that our articles have been helpful even though some of them may have been considered rather crude in the eyes of a few experts. At least, those of our readers who have followed them must have conceived some ideas of what structural chemistry as applied to cement and concrete is all about.

Now Nuclear Chemistry

A few authors and their publishers must think we are making progress, for we have now received for review among others a book called "Isotope Geology,"* by Kalervo Rankama, one of the authors of the book "Geochemistry" which we reviewed in 1951. Anyone who wants to have any understanding of the chemistry which led to the development of A-bombs and H-bombs, as well as the use of all the radio-active elements, must learn something about *nuclear* chemistry. This carries the science of ordinary structural chemistry into the structure of the nucleus or kernel of an atom. How much a knowledge of nuclear chemistry will have of practical value to the student and researcher in cement and concrete remains to be seen, but a radio-active isotope of calcium has already been employed as a tracer in cement research.

We used to think of atoms as composed of a nucleus, made up of a particle with a positive electrostatic charge at the center of orbits in which electrons with negative electrostatic charges circulated (one electron for the hydrogen atom up to 92 for the uranium atom). The nucleus was considered an entity, and the number of positive charges it contained (the same number as of surrounding electrons) is the atomic number of the element. Since all the elements are made up of multiples of the nucleus of the hydrogen atom, the atomic weights should come out whole numbers, if unity (or one) were assigned as the atomic weight of hydrogen. However, it has long been known that most of the atomic weights are not whole numbers; for example, the atomic weight of calcium is 40.08 instead of 40.00, and of silicon 28.6 instead of 28. It has also long been known that the same element obtained from different sources had slightly different atomic weights.

The problem was not solved until the nucleus of the atom was studied by modern scientific methods. Then it was found that the nucleus is not an entity but is now considered to consist of at least 14 distinct particles, the most important of which are called electrons, positrons, protons, neutrons, neutrinos and photons. There has been suggested even another, mesons, which exist in cosmic radiation, and possibly surround the nucleons in atomic nuclei. The protons and neutrons, which are the most essential parts of the nucleus, are collectively called nucleons. Neutrons are conceived of as protons with an orbital electron inside the nucleus, which counterbalances the positive charge on the proton and renders the neutron neutral or without a charge.

The number of protons (as with the same number of electrons outside the nucleus) is always constant for any one element; that is the atomic number, but the number of neutrons in the nucleus of the atom may vary. The protons and the neutrons in the nucleus added together is called the mass number or the nucleon number. Thus one and the same element may have different mass numbers, or different masses (weights), which means those elements have different atomic weights. These are called nuclides as a whole or isotopes of the particular element.

Isotopes in Nature

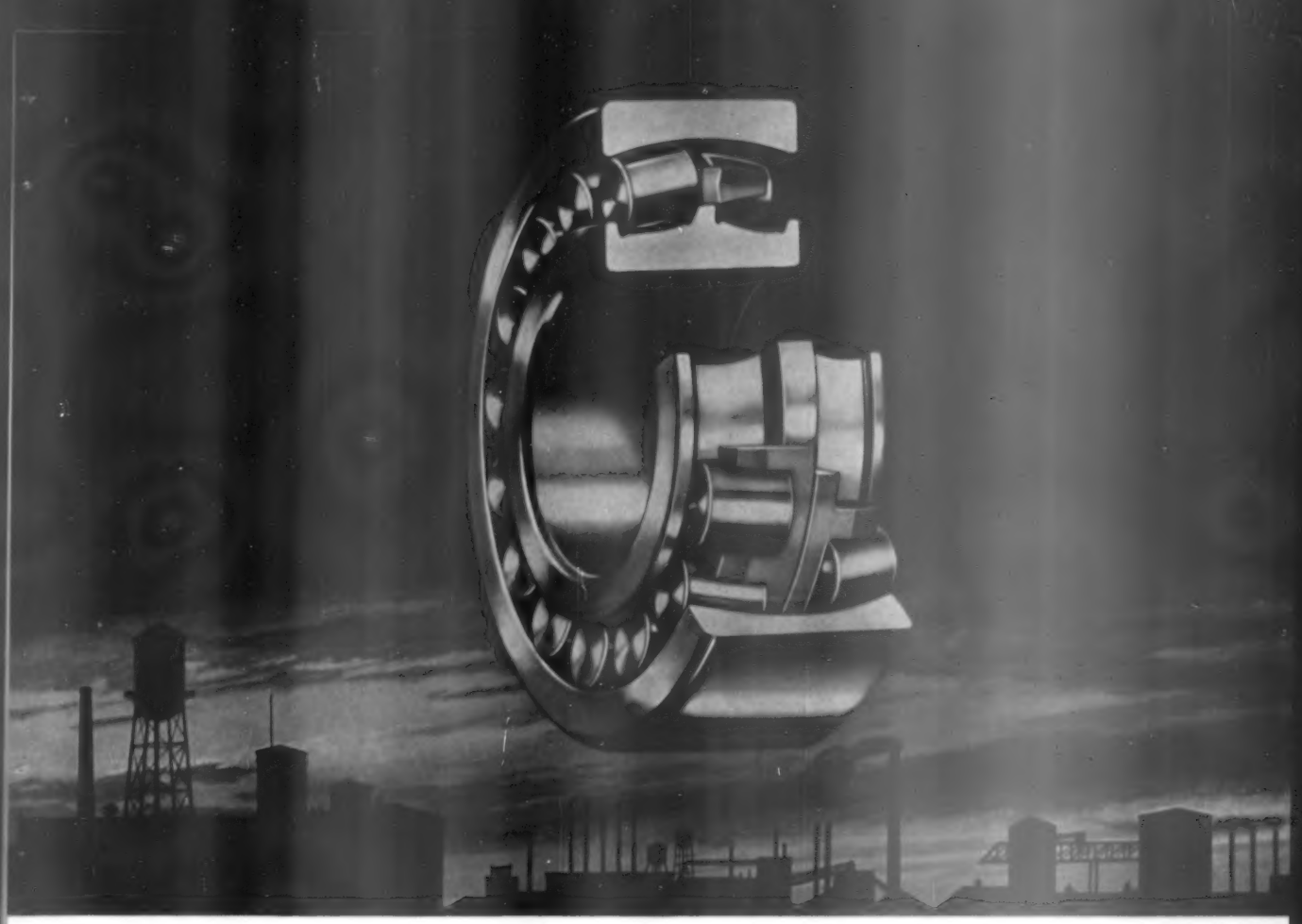
Most readers of all kinds of modern literature, daily newspapers as well as scientific journals, are familiar with isotopes of uranium which figure so prominently in all descriptions of A-bombs. Uranium has three isotopes with atomic weights 234, 235, and 238. This element is No. 92 and hence its number of protons in the nucleus is 92, and the number of electrons in the concentric orbits or shells surrounding the nucleus is 92. But the number of neutrons in the nucleus is 142, 143 or 146. The sum of the protons and the neutrons, which is the mass number of the atom, is therefore 234, 235 and 238, respectively. What isn't so well known is that nearly all the elements have isotopes, some produced artificially, but many existing in Nature.

For example oxygen, which is the most common element on Earth has three isotopes with atomic mass numbers 16, 17 and 18. Oxygen ^{16}O is the commonest, since it comprises 99.759 percent of all oxygen. Hydrogen has two naturally occurring isotopes ^{1}H and ^{2}D — deuterium — which we hear so much about in connection with "heavy water," $^{2}D_2O$. While 99.9844 percent of the hydrogen in Nature is ^{1}H, the remaining 0.0156 percent is ^{2}D and $^{2}D_2O$ (heavy water) occurs naturally in waters all over the Earth and in the occluded water in minerals. Heavy water is therefore composed of hydrogen atoms whose nuclei contain neutrons in addition to the protons, the only particles in the nucleus of hydrogen atoms.

Silicon, which of course, is of much importance in cement and concrete, has three isotopes, ^{28}Si, ^{29}Si and ^{30}Si. The ^{28}Si is the commonest, but 7.73 percent of the silicon in Nature consists of the other two. There are six isotopes of calcium with mass num-

(Continued on page 61)

*McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. Price $12.00.



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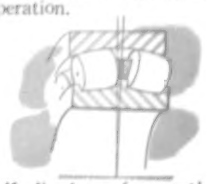

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LABOR RELATIONS TRENDS

By NATHAN C. ROCKWOOD

Plain Case of Secondary Boycott

A CASE OF UNFAIR LABOR PRACTICE was decided by the U. S. Court of Appeals, tenth circuit (Denver, Colo.) which is probably typical of many that arise in the rock products industry. It involved the attempt of the union building trades to compel a general contractor (and sand and gravel supplier) to unionize his employes, although the employes themselves did not desire to join a union. The Denver Building and Construction Trades Council, comprising six building trades unions was the aggressor (the respondent in the case brought by the National Labor Relations Board). These same unions have lost in similar attempts, as readers of this page will recall.

The difficulty that perhaps many producers may encounter in the future is that the N.L.R.B. has revised its rules as to whether or not it will take jurisdiction of similar cases. According to Charles A. Horsky, counsel for the National Sand and Gravel and Ready Mixed Concrete Associations, the cases the N.L.R.B. will consider in the future are governed by these rules:

"(1) *Direct inflow standard*
An enterprise which receives goods or materials from out of state, valued at $500,000 or more.

"(2) *Direct outflow standard*
An enterprise which produces or handles goods and ships such goods out of state, or performs services outside the state in which the enterprise is located, valued at $50,000 or more.

"(3) *Indirect inflow standard*
An enterprise which receives goods or materials from other enterprises in the same state which those other enterprises received from out of state, valued at $1,000,000 or more.

"(4) *Indirect outflow standard*
An enterprise which furnishes goods or services to other enterprises coming within subparagraph (2) above, or to public utilities or transit systems, or instrumentalities or channels of commerce and their essential links, which meet the jurisdictional standards established for such enterprises; *and*
"(a) Such goods or services are directly utilized in the products, services, or processes of such enterprises and are valued at $100,000 or more; *or*
"(b) Such goods or services, regardless of their use, are valued at $200,000 or more.

"(5) *Multistate standards*
An establishment other than retail which is operated as an integral part of a multistate enterprise, *and*
"(a) The particular establishment involved meets any of the foregoing standards; *or*
"(b) The direct outflow of the entire enterprise amounts to $250,000 or more; *or*
"(c) The indirect outflow of the entire enterprise amounts to $1,000,000 or more."

The decision of the court reads in part as follows:

Facts of Case

"The statement of facts, as presented in the brief of the petitioner [the N.L.R.B.] and fully supported by the record, is as follows:

"The Board found that respondents violated Section 8(b)(4)(A) of the Act by picketing and related activities at the premises of Climax Molybdenum Co. (herein called Climax) to induce or encourage employes of Climax and of various neutral contractors on the Climax premises to engage in a concerted refusal to work with the object of: (1) forcing Climax to cease doing business with C. Ryan and Sons (herein called Ryan), a contractor on the Climax premises with which respondents had a labor dispute, and (2) forcing the other contractors (herein referred to collectively as Contractors other than Ryan), to cease doing business with Climax in order to force Climax to cease doing business with Ryan.

"Climax mines and mills molybdenum ore and also maintains a self-sufficient community for its employes within a fenced area of two or three square miles in the mountains near Leadville, Colorado. During the summer of 1953, Climax was engaged in a substantial expansion program. Numerous contracts with four or five prime contractors were under way and, as is customary in the construction industry, several subcontractors were working on the projects. Included among the prime contractors was Ryan which had nine written contracts for grading and excavating building sites, grading roads, enlarging storage and parking areas, installing sewer and water systems, and transporting slag ballast. In addition to these construction contracts and one for open pit mining, which were on a cost-plus-fixed-percentage basis, Ryan had a firm bid contract for furnishing sand and gravel.

"Although not the only earthmoving contractor to which Climax let contracts, Ryan had done business with Climax for 14 or 15 years. Its main office was in Lakewood, a suburb of Denver, some 60 miles from the Climax premises. It employed a work force of 50 or so men, substantially all of whom were currently engaged on its Climax contracts. The extensive equipment required for its operations was owned by Ryan or leased by it from persons other than Climax. Climax had no financial or business interest in Ryan, and no power to hire, discharge, or direct Ryan's employes.

"Because of their long association and the nature of earthmoving work, Ryan's 1953 contracts with Climax contained no detailed specifications. Some of them provided that Ryan would excavate and grade 'as directed' by Climax engineers or 'in accordance with the cut and grades set by' Climax engineers. The parties had an implied understanding that the Climax engineering staff would work ahead of Ryan, placing survey stakes or benchmarks to designate grades and baselines, and check frequently to see that the results were satisfactory. According to Climax, its engineers designate 'not how the contractor does his work but how the work must be completed,' and supervise other contractors on the Climax project in the same manner. Ryan's construction contracts specified commencement and completion dates, but were terminable without notice by Climax.

"Under their typical contracts, Climax compensated Ryan on a 'cost-plus' basis, and any increases or decreases in the wages paid by Ryan to laborers were passed along to Climax except where, as in the case of one elaborate contract performed in 1951, the parties had agreed in advance to a ceiling on such wages. This reimbursable labor item, however, accounted for only a small percentage of the total amounts paid out by Cli-

(Continued on page 112)

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PEOPLE

IN THE NEWS

Arthur Hewitt Retires

ARTHUR C. HEWITT has retired after almost 30 years as chief engineer of the Bellefonte, Penn., plant of Warner Co., Philadelphia, Penn., and will be succeeded by Edgar R. Mallory,

Arthur C. Hewitt

who has been his assistant for many years. Prior to joining Warner Co., Mr. Hewitt was associated with the North American Cement Co. at Hagerstown, Md. In 1925 he became chief engineer for the American Lime and Stone Co., Bellefonte, and continued in this capacity with Warner Co. Born in Cincinnati, Ohio, Mr. Hewitt received his degree in mechanical engineering from the University of Cincinnati. During World War I, he did research work on dust collection for the Aluminum Co. of America. He has always been active in safety matters and served as a director of the Central Pennsylvania Safety Council. A member of A.I.M.E. for many years, he helped organize the Central Chapter of the Pennsylvania Society of Professional Engineers, and served as its president. He was also a vice-president of the Pennsylvania State Society of Professional Engineers, and served as acting president for one year.

Heads Ohio River Sand Co.

CHESTER P. HEGAN has been elected president of the Ohio River Sand Co., Inc., Louisville, Ky., to succeed the late James T. Duffy, who passed away January 14. Mr. Hegan has been serving as vice-president, secretary and general manager. Allen P. Taylor, vice-president of Kentucky Light Aggregates, Inc., a subsidiary, will also serve as vice-president and secretary of the Ohio River Sand Co. Henry A. Pelle, a director of Ohio River Sand Co. for many years, has been named chairman of the board to fill the vacancy created by the death of J. Hamilton Duffy on January 3. J. Paul Thomas, sales manager of Kentucky Light Aggregates, Inc., has been elected a vice-president of that firm.

Officers Retire

B. G. DABNEY, vice-president and general manager at the Plant City, Fla., plant of Coronet Phosphate Co., a division of Smith-Douglas Co., Inc., Norfolk, Va., has retired after 43 years of service. He will be succeeded by R. M. Wilbur, superintendent at the plant. Mr. Dabney is a native of Albermarle County, Va., and became associated with Coronet in 1911, starting in the engineering department. Two years later he was promoted to mine foreman, became general manager in 1941 and a vice-president in 1946.

Mr. Wilbur joined Coronet in 1932, serving in the engineering department, also the research and flotation divisions. He has served as engineer, purchasing agent and assistant superintendent before his promotion to superintendent.

H. W. Norton, chief engineer, also has retired. He joined the company in 1929 as mining superintendent. Born in Bradenton, Fla., he was graduated from the University of Arkansas, Fayetteville, Ark., in 1913.

W. T. Whitney, who also is retiring, has been chief chemist with Coronet since 1909, when he organized and operated the company's first laboratory. He is a native of Gainesville, and a graduate of the University of Florida, Gainesville, Fla.

Assistant Plant Manager

JOHN L. E. KRATZER has been appointed assistant plant manager at the Fogelsville, Penn., plant of Lehigh Portland Cement Co., Allentown, Penn. A graduate of Lehigh University, Bethlehem, Penn., in electrical engineering, Mr. Kratzer joined Lehigh in 1946 as an assistant electrical engineer in Allentown. He was transferred to the Fogelsville plant to set up the maintenance program and became plant engineer in 1949.

John L. E. Kratzer

A.I.M.E. Vice-President

WILLIAM WALLACE MEIN, JR., president of Calaveras Cement Co., San Francisco, Calif., has been elected vice-president of the American Institute of Mining, Metallurgical and Petroleum Engineers. Mr. Mein has been active in the A.I.M.E. since 1936, representing the mining branch. He is also active in the Mining and Metallurgical Society of America, American

Wm. Wallace Mein, Jr.

Society for Testing Materials, and American Concrete Institute. Born in London, England, while his parents were enroute from South Africa to their native California, Mr. Mein graduated from Harvard University, Cambridge, Mass., in 1932. He started his career in the cement industry as a field engineer at the San Andreas, Calif., plazt of Calaveras Cement Co. After two years as geologist and petroleum production engineer for Bishop Oil Co. in Texas and Oklahoma, he resumed his duties as an engineer for Calaveras and transferred to the San Francisco office where he was appointed to various administrative positions. He was elected vice-president in 1941 and president in 1951.

Mr. Mein served as secretary of the California State Mining Board from 1944 to 1954. He was a member of the National Minerals Advisory Council of the U. S. Department of the Interior in 1950, and a member of the Natural Resources Committee of the U. S. Chamber of Commerce in 1951.

Heads Kentucky Association

J. ROBERT THOMPSON, president of the Blanton Stone Co., Inc., Frankfort, Ky., was recently elected president of the Kentucky Crushed Stone Association. He succeeds J. B. Allen, president, The Allen Co., Inc., Winchester, Ky. Emil Berry, owner of the Jefferson County Stone Co., Anchorage, was elected vice-president; R. S. Waters, Waters Construction Co., Elizabethtown, secretary; and Margaret M. Smith, secretary-treasurer, Central Rock Co., Lexington, treasurer. Directors are Sam Nally, Nally & Boone, Bardstown; Raymond A. Matthews, president, Kentucky Stone Co., Louisville; Herman Genet, president, Greenville Quarries, Inc., Greenville; George Geoghegan, Jr., Geoghegan & Mathis, Bardstown; Herbert Wells, West Liberty; and Marion King, Canton. W. O. Snyder, Frankfort, was reelected executive secretary of the Association.

Speakers included Jules E. Jenkins, president, Vibration Measurement Engineers, Chicago, Ill.; Joseph E. Gray, field engineer, National Crushed Stone Association, Washington, D. C.; and Samuel Omasta, assistant executive secretary, National Agricultural Limestone Institute, Washington, D. C.

Collins Heads Kelley Island

FRANCIS J. COLLINS has been named president of Kelley Island Co., Cleveland, Ohio. He was formerly vice-president and will be succeeded in this position by John W. Rockwood, who was general sales manager. Evan J. Evans has been made secretary-treasurer. Ralph L. Dickey, president of the former Kelley Island Lime and Transport Co., has been elected president of Marblehead Limestone Corp., a subsidiary of Minerals and Chemical Corp. of America, Carlsbad, N. M. Willis T. Bell, secretary-treasurer of the former company, has been appointed secretary-treasurer of Marblehead Limestone Corp. Kelley Island Co. recently sold its Marblehead fluxstone quarry to Marblehead Limestone Corp.

General Sales Manager

ALLAN M. DOUGLASS has been appointed general sales manager of Material Service Corp., Chicago, Ill. Well

Allan M. Douglass

known in the building materials industry, Mr. Douglass recently headed his own firm, Douglass Architectural Products Co., Chicago. He is a graduate of the University of Texas, Austin, Texas, and attended the executive program of the University of Chicago.

Marquette Chief Chemists

ALBEN J. COOMBS has been appointed chief chemist at the Des Moines, Iowa, plant of Marquette Cement Manufacturing Co., Chicago, Ill., succeeding J. V. Mandia, who will serve as chemical consultant until his retirement later this year. J. W. Moody has been promoted from chemist to chief chemist at the Brandon, Miss., plant. Mr. Coombs joined Marquette after serving as plant chemist for Glens Falls Portland Cement Co., Glens Falls, N. Y., for a number of years. Prior to that he had been with the Green Bag Cement Co. since leaving Ohio State University, Columbus, Ohio. Mr. Moody became associated with the company in 1951 after serving a short time with the Mississippi Testing Laboratories. He is a graduate of Mississippi College, Clinton, Miss., with a degree in chemistry.

67 Years of Service

H. WARNER OVERLEY, SR., has retired as assistant treasurer of the Louisville Cement Co., Louisville, Ky., after 67 years of service. He is 82 years old and started in the cement industry when he went to work in 1887 for the old Western Cement Association, of which Louisville Cement Co. had a controlling interest. In 1907, when the association went out of business, Mr. Overley joined the parent company. He was made general auditor in 1919 and assistant treasurer in 1924.

Charles Ireland Honored

CHARLES W. IRELAND, president of the Birmingham Slag Co., Birmingham, Ala., has been elected a member of the national Young Presidents' Organization. All members of this organization, numbering some 735 in 39 states, became top executives before reaching 39. Their corporation must gross a minimum of $1 million in sales a year and the range is upward to $176 million. Mr. Ireland became president of his company in 1951 at the age of 34.

Material Service Officers

GEORGE L. KIRP, general production manager of Material Service Corp., Chicago, Ill., has been elected a vice-president, and Joseph W. Leahy has been elected comptroller. Mr. Kirp, one of the nation's foremost quarry men, has been active in concrete industry research and operations for over 30 years. He is a chemical engineering graduate of Purdue University, Lafayette, Ind. Mr. Leahy, a graduate of Mount St. Mary's College, Emmitsburg, Md., has been serving as assistant comptroller. He succeeds Milton Falkoff, vice-president and treasurer, who has relinquished the duties of comptroller.

Manager of Sales

J. A. VALENTINE has been appointed manager of sales of the Michigan limestone division, U. S. Steel Corp., New York, N. Y., in addition to his duties as manager of the northern district of the division, with headquarters at Rogers City, Mich. E. A. Weymouth has been named assistant manager of sales for the eastern division; N. O. Hoeft has been made manager of the Bradley Transportation line operations and assistant manager of sales, traffic, Michigan limestone di-

vision; and L. J. Patterson has been appointed manager of the calcite plant in Rogers City. Herman Luebke has been made traffic manager of the northern district.

I.M.C.C. Managers

F. B. BOWEN, manager of the Florida department of the phosphate minerals division of International Minerals & Chemical Corp., Chicago, Ill., has been appointed production manager of the division. R. H. Linderman has been named domestic sales manager, and Edward F. Perkins has been made assistant export sales manager in addition to his duties as European sales manager for the phosphate minerals division.

Assistant Sales Manager

CHARLES H. BOYD, JR., has been appointed assistant sales manager at the Birmingham, Ala., office of Universal Atlas Cement Co., New York, N. Y. A native of Gaffney, S. C., Mr. Boyd graduated from the University of North Carolina, Chapel Hill, N. C., with a B.S. degree in civil engineering. Before joining Universal Atlas as salesman at Birmingham, he served as civil engineer with the Tennessee Valley Authority, Knoxville, Tenn.

Assistant Secretary

ADAM M. WYANT has been appointed assistant secretary of the National Gypsum Co., Buffalo, N. Y. A graduate of Lafayette College and the University of Virginia law school, Mr. Wyant joined the company in 1946 and has served as assistant in the division of plant labor relations and as administrative assistant in the secretary's department.

U. S. Gypsum Appointments

T. W. COWDRICK has been appointed district manager of the Manhattan district of United States Gypsum Co., Chicago, Ill., succeeding Robert R. Heiges, who has resigned. Mr. Cowdrick was formerly Providence district manager and will be succeeded by D. W. McNeish. A. M. Personeus, formerly line salesman at Syracuse, has been named to replace Mr. McNeish as sales promotion supervisor of the northeast division.

On University Board

KENNEDY ELLSWORTH, executive vice-president of the United States Lime Products Corp., Los Angeles, Calif., and of the Arrowhead Lime and Chemical Co., has been elected a member of the board of trustees of the University of Southern California for a one-year term concurrent with his presidency of the Southern California General Alumni Association. Mr. Ellsworth is a graduate of the Southern California School of Commerce.

Receives Citizenship Award

THOMAS C. FOLEY, president of the Wichita Sand and Gravel Co., Wichita Falls, Texas, was recently presented the Fourth Annual Citizenship Award by the Wichita Falls Civitan Club. Mr. Foley is also vice-president of the Texas Redi-Mix Concrete Association.

Assistant Manager

H. B. DUBOIS has been named assistant manager of the Consolidated Feldspar department, industrial minerals division, Erwin, Texas, of International Minerals and Chemical Corp., Chicago, Ill. He was formerly sales manager and will be succeeded in this position by W. K. Burriss.

OBITUARIES

RAYMOND A. WETZLER, chairman of the board, The Whitehall Cement Manufacturing Co., Philadelphia, Penn., died March 26 after a brief illness. He was 66 years old. Mr. Wetzler started his career in the cement industry in 1907 when he joined the Atlas Cement Co. He had also been associated with Thomas A. Edison as vice-president of the Edison Cement Co. In 1947 he became president of The Whitehall Cement Manufacturing Co., retaining that position until the beginning of 1955 when he was elected chairman of the board and Chester S. Crawford, formerly executive vice-president, succeeded him as president.

HOMER SLY, vice-president of the Petoskey Portland Cement Co. and manager of the Petoskey Crushed Stone Co., Petoskey, Mich., died March 17 at the age of 83. Mr. Sly served as mayor of Petoskey from 1912 to 1913. He was a member of the board of education for 30 years, 28 of which he served as president. He was a former president of the Chamber of Commerce and founder of the Sly Auto Co.

JOHN R. NEWELL, Helms Concrete Pipe Co., Alexandria, Va., died March 13 at the age of 70. After graduating as a mining engineer from the University of Minnesota, Minneapolis, Minn., Mr. Newell moved to Oregon to work for the Oregon Electric Railway Co. In 1916 he joined the late C. H. Bullen in the Concrete Pipe Works of Portland, Ore. After service in World War I, he became part owner and general manager of the Spokane Concrete Pipe Co., Spokane, Wash., in 1919. Nine years later he moved to Chicago as part owner and general manager of the Mid-West Concrete Pipe Co., Franklin Park, Ill., where he remained until the company changed ownership upon the death of his partner, C. H. Bullen.

MAURICE B. JEWETT, president of the Cleveland Gypsum Co., Cleveland, Ohio, subsidiary of the Cleveland Builders Supply Co., died March 14 at the age of 78. A graduate of Oberlin College, Oberlin, Ohio, and Cleveland Law School, Mr. Jewett was associated with the Cleveland Builders Supply Co. for 46 years, before becoming president of its subsidiary, the Cleveland Gypsum Co.

MICHAEL HENDY, founder and retired treasurer of the Mississippi River Sand and Materials Co., St. Louis, Mo., died March 20 following a month's illness. He was 86 years old. Mr. Hendy founded the company in 1925 and served as treasurer until his retirement about 10 years ago.

FRANK R. DITTOE, manager of industrial relations, Kelley Island Co., Cleveland, Ohio, died March 11 in Rocky River, Ohio, after several months' illness. He was 45 years of age. A native of Somerset, Ohio, Mr. Dittoe was a graduate of Notre Dame University, Notre Dame, Ind.

THOMAS M. MCCARTHY, owner of R. E. McCarthy & Sons, Syracuse, N. Y., died March 17 at the age of 48.

JOSEPH HUNSCOVSKI, owner of the Hunscovski Sand and Gravel Co., Salina, Kan., died suddenly on March 5. He was 57 years old.

GEORGE HEINTZ, a partner with his son, George, Jr., in the Concrete Products Manufacturing Co., Syracuse, N. Y., died March 25 at the age of 57.

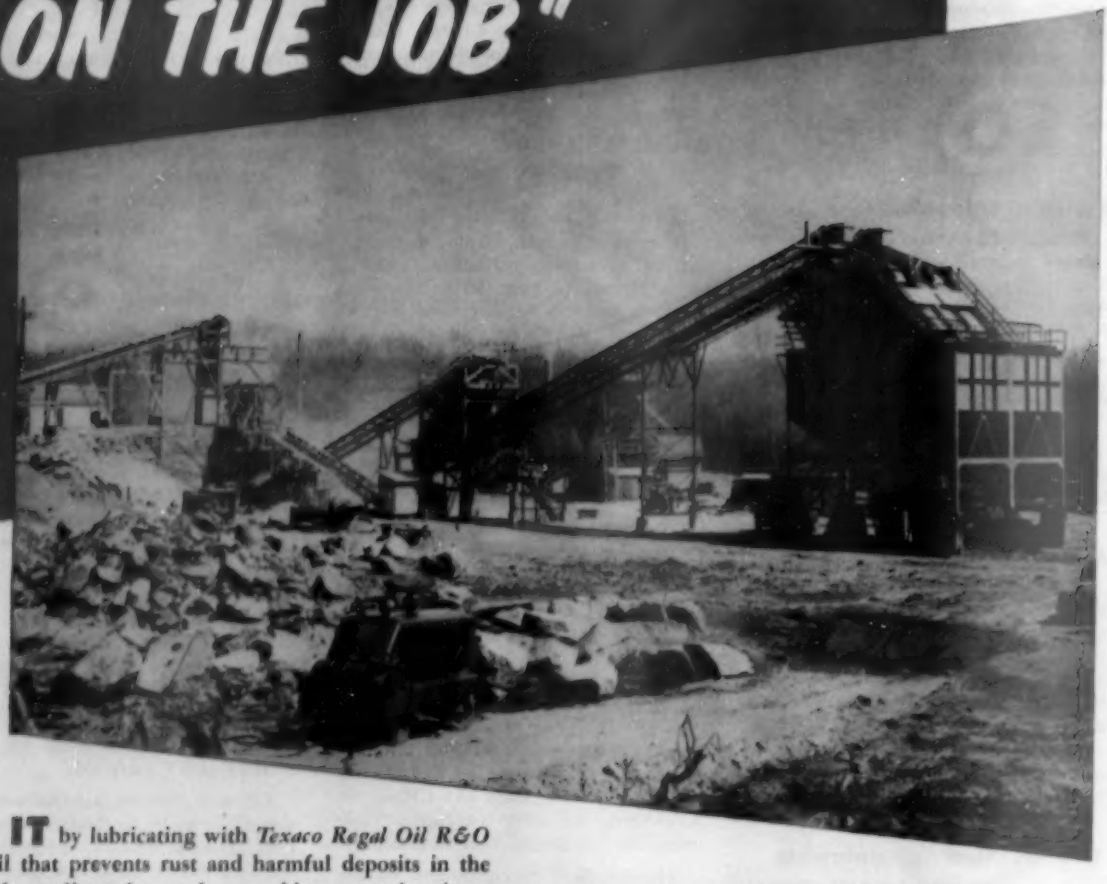
ARTHUR L. THOMPSON, of New Lexington, Ohio retired engineer for the Nugent Sand Co., Louisville, Ky., died March 12. He was 77 years of age.

J. C. PARKHURST, retired superintendent for the Sanderson-Porter Concrete Co., Bellevue, Ohio, died February 15 after a short illness. He was 75 years of age.

WILLIAM MCINTOSH, former assistant superintendent at The Carbon Limestone Co., Lowellville, Ohio, died February 11 following a short illness. He was 75 years old.

MRS. MARIE PIERSON, vice-president of the Pierson Bros. Sand Corp., Milwaukee, Wis., died March 3 at the age of 79.

KEEP YOUR AIR COMPRESSORS "ON THE JOB"



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INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S COVER is shown an aerial view of the Jeffrey mine of Canadian Johns-Manville Co., Ltd., at Asbestos, Que. It is said to be the world's largest asbestos mine, producing 56 percent of Canada's output. When the new mill is completed in 1956, it will have an annual capacity of 625,000 tons. The view shows conveyors from mine to mill, some of the storage facilities, and the city of Asbestos, Que., in the background. The article about the mine in this issue will deal with the interesting block-caving mining methods. The asbestos ore body is a massive block with a horizontal dimension of 2200- x 2700-ft.

Whitehall Cement Plant Improvements

THE WHITEHALL CEMENT MANUFACTURING CO., Philadelphia, Penn., produced a record 2,021,000 bbl. of cement during 1954, and shipments were at an all-time high at 1,993,000 bbl., according to Chester S. Crawford, president. In 1954, unit coal firing mills were installed on each of the six kilns at its cement plant, and electrical facilities were rebuilt and a transformer station added. In March, 1955 new primary crushing facilities were installed at its limestone quarry, and secondary crushing equipment, concrete storage silos, raw materials proportioning facilities, and an unloading station for incoming materials were completed. Installation of storage silos to increase the capacity by about 40 percent is presently underway, and the installation of a seventh kiln has been authorized.

Plans Gypsum Plant

NATIONAL GYPSUM CO., Buffalo, N. Y., has announced plans to build a gypsum products plant, costing $6,000,000 or more, in the Houston, Texas, Gulf Coast area. Possible locations along the Gulf Coast as far east as New Orleans, La., are being considered. The proposed plant will manufacture finished gypsum products, including lath, wallboard, sheathing and plaster. It also will provide warehouse facilities for about 150 products in the firm's line. The plant is expected to require approximately 100,000 sq. ft. of space.

Minerals and Chemicals Buys Lime Plants

CHEMSTONE CORP., a subsidiary of the Minerals and Chemicals Corp., of America, recently acquired the Marbelhead, Ohio, plant and the Lakeside and Marblehead Railroad, formerly owned by Kelley Island Co. Chemstone Corp. is also managing the Presque Isle, Mich., quarry and plant located on Lake Huron, producing fluxstone. In addition, the Strasburg Lime Co., and Dominion Limestone, Inc., with plants near Strasburg, Va., have been acquired by Chemstone Corp. Officers of the corporation, formerly with Kelley Island, are Ralph L. Dickey, president; John V. Andrews, vice-president; Willis T. Bell, secretary-treasurer; William A. Roberson, chief engineer; Arthur K. Hausmann, sales manager; and Charles E. Walmsley, superintendent, Marblehead plant.

Roofing Granule Plants

MINNESOTA MINING AND MANUFACTURING CO., Roofing Granule Div., St. Paul, Minn., set an all-time high in dollar volume and tonnage shipped in 1954. According to the company, the increase was due largely to the growing use of white and pastel granules by roofing manufacturers and home builders.

Expansion of the Wausau, Wis., plant was completed in 1953, enabling the plant to meet the demands of the heavy fall shipping period. The Little Rock, Ark., and Corona, Calif., plants met peak seasonal demands without difficulty, according to the firm's annual report. Additional kiln capacity is being installed at Little Rock, and is scheduled for completion by mid-1955. The company is planning the establishment of a granule plant in New Jersey.

Acquire Perlite Mine

GREAT LAKES CARBON CORP., Perlite Division, Los Angeles, Calif., has taken over operation and management of California Perlite Corp., including its perlite mine and plant facilities at Klondike, Calif. The corporation plans to extend its Permaline franchise system, for distribution of perlite aggregates for plaster and concrete throughout the West Coast market area. Operation of the mine and plant at Klondike will provide a source close to the market. The firm also operates perlite mines at Socorro, N. M., and Rosita, Colo.

Perlite Acquisitions

INTERNATIONAL MINERALS & CHEMICAL CORP., Chicago, Ill., has purchased U. S. Mining Co. and Peerless Perlite Co., both of Los Angeles, Calif., as announced by Louis Ware, president. The acquisition includes reserves of perlite in Inyo County, Calif., a drying and grinding plant near Big Pine, Calif., and a perlite expanding plant in Los Angeles. The properties are being operated by the Industrial Minerals Division.

U. S. Subsidizes Agstone in Ireland

ACCORDING TO A REPORT in the *Chicago Daily Tribune*, March 23, 1955, an agreement has been signed by Irish External Affairs Minister Lian Gosgrave and American Ambassador W. H. Taft, under which Ireland will use American aid funds to provide farmers with limestone to improve their land. The agreement provides that Ireland can use $4,900,000 of a $17,157,000 grant to defray the delivery cost of the limestone.

Ash Grove Increasing Capacity

ASH GROVE LIME AND PORTLAND CEMENT CO., Kansas City, Mo., is installing a new kiln and additional grinding facilities at its Chanute, Kan., cement plant. Additional storage facilities are also being added, and three of the plant's present buildings are being enlarged. Total cost is expected to total approximately $2,000,000. K. W. Wright is plant superintendent.

Bituminous Mixing Plant

MIXED CONCRETE AND SUPPLY CO., Wichita, Kan., has received a building permit to construct an asphalt mixing plant and accessory buildings, at a total cost of about $38,000. An electronic control building, a reinforced concrete tunnel, and a metal tower support for a car "shakeout" are among the facilities being built.

Expands Phosphate Operations

THE SHEA CHEMICAL CORP., Baltimore, Md., has announced an expansion program, designed to double its capacity for producing elemental phosphorus and sodium phosphates. Expansion is expected to be completed by the end of 1956, and calls for a new phosphate rock washing and preparation plant at Columbia, Texas. Other projects include installation of a second 20,000-ton phosphorus furnace at Columbia, Texas; a sodium phosphate and phosphoric acid plant in Dallas, Texas; and enlargement of the Adams, Mass., plant.

The phosphate rock washing and processing plant at Columbia will enable the firm to develop and utilize phosphate rock deposits which it acquired during the past year. Total cost of the expansion program is expected to exceed $5,000,000. Vincent H. Shea, president of the corporation, is a past president of the National Agricultural Limestone Association.

Air Pollution Meeting

THE AIR POLLUTION CONTROL ASSOCIATION will hold its 47th annual meeting, May 22-26, at the Sheraton-Cadillac Hotel, Detroit, Mich. The program includes reports by air pollution control experts from the United States and Canada on recent findings in smoke abatement, air pollution measurements, odor control and developments in abatement equipment. Other sessions include "The Effect of Pollutants on Plants and Animals," by Dr. D. M. Thomas of Stanford Research Institute and "Meterological Effects" by Dr. Maynard Smith, government consultant with Brookhaven National Laboratories. Guest speaker at the banquet will be Dr. Kenneth McFarland, educational consultant and lecturer for General Motors. The program also includes several field trips, including a visit to the air pollution control installation at Peerless Cement Co.

Map of Commercial Lime Plants

THE NATIONAL LIME ASSOCIATION has published an up-to-date map showing, attractively in black and red, location of the 105 commercial lime plants operating in the United States. Only lime burning plants that sell all or a portion of their production on the open market are given on the map. This excludes captive plants, as well as dead-burned dolomite plants and extremely small pot kiln plants which operate sporadically and on a local basis. Dolomitic lime plants are indicated in red, and high calcium plants are signified by black color. A combination of black and red indicates both types of lime produced. The type of kilns utilized by the plants is also shown on the map, a black dot signifying vertical kilns, and a square dot signifying rotary kilns. Vertical kilns include standard and large capacity gas-fired vertical kilns, mixed feed, Ellernan, Fluo-solids, and pot kilns. Some of the rotary plants shown also operate vertical kilns.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 22,290,000 bbl. of finished cement in December, 1954, as reported by the Bureau of Mines. This was an increase of 10 percent over the December, 1953, figure. Mill shipments totaled 16,347,000 bbl., 16 percent more than in December, 1953, while stocks were 13 percent less than on the same date a year ago. Clinker production during December, 1954, totaled 24,029,000 bbl., an increase of 11 percent from the December, 1953, total. The output of finished cement during December, 1954, came from 157 plants located in 37 states and Puerto Rico. During the same period of 1953, 20,243,000 bbl. of finished portland cement were produced.

Use Fluid Coke as Fuel

HENRY J. KAISER CO., Kaiser Engineers Div., Oakland, Calif., has announced the successful use of fluid petroleum coke as a fuel at its cement plant at Permanente, Calif. Normal production operations were neither interrupted nor reduced when the fluid coke was injected into the fuel system. The fluid coke is a petroleum product resulting from a refining process which converts low-value, heavy residual oils into lighter oils. The industrial product, substantially all carbon, is a dry granular material having the consistency of sand. The coke-producing process is a recent development of Esso Research and Engineering Co. laboratories.

To Build Cement Plant

HALLIBURTON PORTLAND CEMENT CO., Corpus Christi, Texas, has acquired an 82-acre tract of land at Phoenix, Ariz., for the building of a cement plant. Crushed limestone will be piped through a 110-mile pipeline from a quarry near Clarkdale, Ariz. The company agreed to comply with present and future municipal regulations regarding dust or smoke, and waived rights to dig sand or gravel at the Phoenix site. Any claims which might arise because of sewer odors were also waived.

General Portland Expansion

GENERAL PORTLAND CEMENT CO., Chicago, Ill., has announced a $1,500,000 expansion and rehabilitation program for its Signal Mountain, Tenn., cement plant. Smith W. Storey, president, stated that plans include installation of a 425-ft. kiln, and development of a limestone quarry in the Benett's Lake section of the Tennessee River.

N.S.G.A. and N.R.M.C.A. Shows at Chicago's Coliseum

THE EXECUTIVE COMMITTEES of the National Sand and Gravel Association and National Ready Mixed Concrete Association have announced the 1956 biennial show will be held February 13-16, at the Chicago Coliseum, with hotel headquarters and convention sessions a few blocks away at the Conrad Hilton Hotel. The February 10-13, 1958 show has also been scheduled for the Coliseum.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of March were listed by the Portland Cement Association as follows:

	Sq. yd. awarded during March, 1955
Roads	3,987,709
Streets and alleys	3,494,980
Airports	2,021,291
Total	9,503,980

Ponce Cement Expands

PONCE CEMENT CORP., Ponce, Puerto Rico, is expanding its cement plant, and installing a 12 x 500-ft. Allis-Chalmers kiln with a daily capacity of about 4300 bbl. of cement. Additional facilities will also include two 8 x 40-ft. wet grinding "Compeb" mills driven by 1000-hp., "Hytork" motors; two full voltage magnetic starters; a 6 x 100-ft. air-quenching cooler; and a 2000-k.v.a. transformer.

Buys Silica Company

J. R. SIMPLOT CO. has purchased the Nunn Co., Overton, Nev., which is being operated as Simplot Silica Products, Inc. The Nunn company has been mining, processing and marketing silica for 20 years, with a plant capacity of 10,000 tons annually. Keith Madill is manager of the reorganized firm, and Don Ferguson is plant superintendent.

Cement Research Program at Toledo Meeting

THE INSTITUTE OF SILICATE RESEARCH recently held a program on cement research at the University of Toledo. T. C. Powers, manager of the basic research section of the Portland Cement Association, spoke on "Application of Physico-Chemical Methods to Portland Cement Research," and Dr. Fred Ordway, acting director of the P.C.A. fellowship at the National Bureau of Standards, Washington,

spoke on "Research at White Heat to Satisfy the Burning Desire of the Cement Industry." Dr. Wilhelm H. Eitel, director of the silicate institute, was chairman. Open-house of the institute's laboratories was held after the meeting.

Taking Industry Census

THE DEPARTMENT OF COMMERCE, Bureau of Census, is conducting simultaneous censuses of mineral industries, manufacturers and business. These censuses will provide facts about manufacturing; mineral industries; retail and wholesale trade; and selected services, including personal, business and repair services, hotels, and tourist courts; amusement places, and the motion picture industry. The census of mineral industries provides for an enumeration of about 35,000 mines, quarries, and oil, and gas operations. Data is being gathered, for the first time since 1939, on the number, size, location and character of operations in the mineral industries, as well as data on number of workers, value of products, principal expenses, expenditures for plant and equipment, quality of fuels and electric energy consumed, and horsepower of power equipment installed. The census is a mail canvas and is coordinated with the Bureau of Mines statistical program, with joint schedules being used insofar as feasible.

Industrial and trade census reports are utilized for reference data by businessmen in preparing production and sales programs, developing markets, arranging distribution through efficient channels, etc. Market research organizations, trade associations, advertising agencies and many other services depend to a large extent on the census for basic statistical information. Thus, data which businessmen use from trade associations, advertising agencies and many other services depend to a large extent on the census for basic statistical information. This data, which businessmen use from trade association sources and market services, are based on census materials which would not be available if they did not first supply the raw material, so to speak, in the form of their reports to the Census Bureau.

Slag-Cement

IN EUROPE, cements are being marketed which are produced by grinding a high-alumina granulated blast furnace slag with anhydrite and an alkali, catalyst, which may be lime or portland cement. Crystalline hydrated sulfo-aluminate is produced in the presence of the alkali. The lime, apparently is required to prevent acid silicate gels from forming over the surface of the slag grains to hamper the reaction with the alumina in the slag. Gels of hydrated calcium sulfo-aluminate, both high and low sulfate forms of sulfo-aluminate and aluminum hydroxide are produced. Sanding of the supersulfate cement concretes is due to the action of atmospheric carbon dioxide on the sulfo-aluminate. *(Zement-Kalk-Gips, Vol. 7, No. 12, p. 449, 1954.)*

Adds Kiln for Lightweight Aggregate

THE SUNNYHILL AGGREGATES CORP. plant at New Lexington, Ohio, has installed a new kiln, increasing production by more than 100 percent. The company produces lightweight shale aggregate.

Start Agstone Operations

WILSON ROCK AND LIMESTONE CO. recently began quarrying operations at Ashland, Wis., to produce agricultural limestone for distribution in surrounding counties under the government's soil conservation program.

A.S.T.M. 1954 Standards

THE AMERICAN SOCIETY FOR TESTING MATERIALS has announced the 1954 supplements to the 1952 book of A.S.T.M. standards which is published triennially. The supplements give specifications, tests, definitions, etc., in the latest form, except the chemical analysis of metals. The supplement is comprised of seven parts, with Part 3, 416 pages long, pertaining to cement, concrete, ceramics, thermal insulation, road materials, waterproofing, and soils. It includes 77 standards covering cement (portland, portland-pozzolan, magnesium oxychloride, and magnesium oxysulfate); lime; gypsum; mortars (chemicals resistant and masonry); masonry buildings units; pipe and drain tile; refractories; ceramic whiteware; porcelain enamel; glass and glass products; thermal insulating materials; mineral aggregates; concrete; highway materials (bituminous and non-bituminous); waterproofing and roofing materials; soils; and general testing methods. The supplements have heavy paper covers, and are available from the A.S.T.M. office at 1916 Race St., Philadelphia 3, Penn., at $3.50 per part or $24.50 for the complete set of seven parts.

Reduces Stock Par

NEW ENGLAND LIME CO., Adams, Mass., stockholders voted to reduce the par value of common stock from $5 to $2, and approved a three-for-one stock split.

Korean Cement Plant

THE UNITED NATIONS KOREAN RECONSTRUCTION AGENCY, in cooperation with the Republic of Korea, is building a $5,000,000 cement plant at Mungyong, in Southeastern Korea.

Change Stock Value

STOCKHOLDERS of Northwestern Portland Cement Co. have approved a change in its second preferred stock from $38 par value to a no-par designation.

Gravel Firms Merge

BUCKEYE SAND AND GRAVEL CO. of Bellaire, Ohio, and H. L. Seabright Co., Wheeling, Ohio, have merged under the H. L. Seabright name.

Coming Conventions

May 11-13, 1955—
National Industrial Sand Association, Spring Meeting, The Homestead, Hot Springs, Va.

May 17-18, 1955—
Empire State Sand, Gravel and Ready Mix Association, Fourth Annual Meeting, Hotel Rochester, Rochester, N. Y.

June 26-July 1, 1955—
American Society for Testing Materials, 58th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

August 8-10, 1955—
National Cinder Concrete Products Association, Summer Meeting, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

January 23-25, 1956—
National Concrete Masonry Association, 36th Annual Convention, Roosevelt Hotel, New Orleans, La.

February 20-22, 1956—
National Crushed Stone Association, 39th Annual Convention and Exposition, Conrad Hilton Hotel, Chicago, Ill.

HINTS AND HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Movable Store Room-Office

A WESTERN SAND AND GRAVEL PRODUCER, using a Sauerman Crescent drag scraper in the pit, mounted the

Storeroom-office *provided under drag scraper hoist*

hoist on heavy steel "I" beams sufficiently high so that the operator could see the scraper in action. Space under the hoist was lined with steel plate, making a room which was used as a combination storeroom and temporary office. Supports are rugged enough so that the hoist can be moved about the site, if desired.

Portable Bucket Elevator

FOR JOBS remote from the permanently established plant, a western ready-mixed concrete producer uses a Travel Batcher. To give added portability to the assembly of units, the bucket elevator has been equipped with a pair of truck wheels and axle and a tongue to hitch it to a semi-trailer truck. To feed the bucket elevator, an inclined screw conveyor and drive are bolted to the lower end of the elevator to permit dis-assembly when it is moved to a new location. Trucks deliver bulk cement to the plant. The winch and cables of the Travel Batcher are used to erect the elevator and silo.

Steel Reclaiming Tunnel

IN THE ILLUSTRATION is shown a reclaiming tunnel which is of steel construction and rectangular in cross section. It is made up of relatively

Steel lined reclaiming *conveyor tunnel*

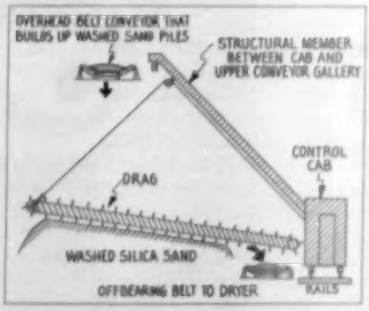
short sections. The steel plate lining sections are spot welded sufficiently to hold them in place until the load of gravel over the tunnel gives added support. The reclaiming belt conveyor motor circuit is tied in with an ammeter of the recording type. The belt remains loaded at all times, and the gate opening also is left open. Truck drivers load their own trucks with the ammeter giving a time-load indication as to the tonnage loaded.

Left: Portable bucket elevator. Note truck wheels and axle attached to elevator. **Right: Screw conveyor** is bolted to elevator for portability

Wet Sand Feeder

A SILICA SAND OPERATION in the Southwest follows the general practice of first washing all material from the pit to free it as much as possible from clay and other impurities. The washed sand is then ground-stored in several piles by means of an overhead belt conveyor system. The wet sand is then fed continuously to the dryer. Dried sand is screened to make the various products sold.

To feed the wet sand continuously to the rotary dryer, the plant uses the drag-scraper arrangement shown in the illustrations. The scraper employs the same principle as the sand drags used for de-watering commercial sand. It is assembled with two parallel chains, similar to those used in bucket elevators, to which scraper blades are attached, the entire assembly being mounted on a boom that can be raised or lowered from the control cab. The


OVERHEAD BELT CONVEYOR THAT BUILDS UP WASHED SAND PILES
STRUCTURAL MEMBER BETWEEN CAB AND UPPER CONVEYOR GALLERY
CONTROL CAB
DRAG
WASHED SILICA SAND
OFF-BEARING BELT TO DRYER
RAILS

Continuous feeder arrangement *to convey wet sand to dryer*

control cab rides on rails adjacent to and parallel with the off-bearing belt conveyor. The steel gallery supporting the belt conveyor that carries material to the storage piles acts as the outboard or supported end of the scraper. The sketch shows the essentials of the feeder.

Controls are available in the cab so that the operator can move the entire assembly laterally to take material from any desired pile. He can also raise or lower the drag boom, speed up or slow down the f.p.m. rate of the drag itself. An operator is stationed in the cab all the time although

Portable feeder arrangement: (A) supporting structural member between upper conveyor gallery and control cab, (B) portion of the drag scraper, (C) upper belt conveyor gallery, (D) enclosed control cab

the device functions for short periods without an attendant. In the illustration, (A) is a structural member between the upper conveyor gallery and the cab, (B) is a portion of the drag scraper, (C) is the upper belt conveyor, and (D) is the enclosed cab.

Dry Sand Screening

EARLY PIONEERS in the sand and gravel industry usually started operations with dry screening. The first screens were simple stationary devices with a man wielding a hand shovel. Later wet screening took over, using large amounts of water, and more elaborate sand recovery units later in the flow of material through the plant.

A western producer has found it advantageous to still use dry screening to prepare a dry sand. Later in the flow, the dry sand stream is split and a substantial part of it is washed. Under this arrangement, the plant produces four sands; a washed and dry masons sand, and a washed and dry concrete sand.

To take off the dry sand, rotary screens are used, one for the masons and one for the concrete sand. Steel brushes are mounted on each trommel screen as shown in the illustration. The brushes can be easily moved and replaced by a simple locking device.

Rotary screens equipped with easily removable steel brushes

Long Hand Levers Load Trucks

IN THE ILLUSTRATIONS are shown two applications of long hand levers to operate bin gates in loading trucks. These applications were found in plants in Kentucky and Illinois.

Above: Long hand lever to operate bin gates for loading trucks. **Below: Five long hand levers** for bin gates facilitate truck loading

The illustration at the top shows an interesting conical shaped bin with the truck operator pulling long handled lever to open bin gate. The lever is hinged and supported near the top of the cone section of the bin. Ample leverage is available by the use of a long handle.

In the bottom view, five levers to operate bin gates are shown. Above the bins may be seen the final screens.

Drivers Load Trucks

IN CALIFORNIA "U.R.B" is the symbol for "Untreated Road Base," a product in wide use for highway work. At the plant where the illustration was taken, a continuous stream of trucks were hauling the material to the job,

Fully automatic truck bin loader with vibrating feeder for belt conveyor in tunnel. Truck drivers load their own vehicles

and each truck driver loaded his own truck by means of the reclaiming belt conveyor and hopper shown. A Syntron vibrating feeder is used in the tunnel and the belt is kept loaded. When the bin is full, the belt conveyor stops. The truck driver simply presses a button, and in a matter of seconds the truck is loaded and another takes its place. The entire operation is automatic.

Augment Stockpiling Capacity

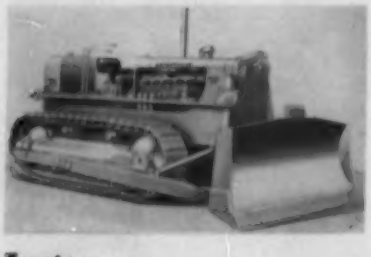
A LARGE PRODUCER OF SAND AND GRAVEL in the Southwest stockpiles over a reclaiming tunnel belt conveyor, using a horizontal-travelling shuttle belt conveyor that rides a steel overhead gallery. To get additional storage, a short belt conveyor has been added to the assembly as shown in the illustration. This short conveyor can be swung around over the hopper, and the shuttle belt conveyor can be used to obtain more tonnage in the stockpile. The shuttle belt conveyor does not show in the picture.

Sand is stored by swinging boom belt conveyor (A) to fill hopper (B)

NEW MACHINERY

Rotary-Air Blast Drill

JOY MANUFACTURING CO., Henry W. Oliver Bldg., Pittsburgh 22, Penn. has announced the Model 60-BH, Super Heavyweight Champion rotary-air blast drill, designed for 9- to 12-in. holes. A roller-cone type bit pressure cuts the rock while a blast of compressed air continuously removes cuttings from the hole. Additional features include a rod handling device and power air swivel; variable speed motor operating through a five-speed transmission to provide torque at the desired bit r.p.m. and tramming or hoisting speed; and fully automatic hydraulic chuck. The unit weighs 90,000 lb., and bit pressure is rated at 60,000 lb.



Tractors

CATERPILLAR TRACTOR CO., Peoria, Ill., has introduced two D8 tractor models, a torque converter, Series D, and a direct drive, Series E, as well as matching attachments. With a three-stage 5:1 torque converter, the Series D has speeds up to 7.4 m.p.h. through a constant mesh transmission which has three speeds forward and three in reverse. The Series E direct drive has five forward speeds and three in reverse. Speeds range from 1.5 to 5.2 with the standard transmission, but optional transmission permits speeds as low as 1.4 m.p.h. to as high as 7.2 m.p.h. The D8 engine develops 191 hp. at 1200 r.p.m., and features a "live shaft" drive, independent of the flywheel clutch, which provides constant power for rear-mounted cable controls and steering clutch booster pump drive.

The tractor has seven-roller track frames for improved flotation, traction and stability. The fuel tank has a capacity of 118 gal., to permit a full 12-hr. work shift without refueling. It features full pressure, bevel gear lubrication, and a two-unit transmission lubricating pump is located outside the transmission for easy access. The Series E model has a long-wearing oil clutch, and the Series D incorporates a single plate dry clutch, adapted to the torque converter. Operating weight of the Series D is 41,265 lb., and the Series E, 40,430 lb.

Bituminous Mix Plant

IOWA MANUFACTURING CO., Cedar Rapids, Iowa, has announced a batch-type bituminous mixing plant, Model H-15, with a capacity of 35 to 60 t.p.h., depending upon job specifications. It is a stack-up, tower-type plant, consisting of a hot elevator, screen and bin section, batcher and mixer station, bitumen pump, jacketed bitumen piping and valve, stair-way, platform, controls and drives. It is offered as a portable or stationary plant with a choice of combustion engine or electric motor drive. The gates and valves are operated manually through mechanical linkage, except the mixer discharge gate which has a manually controlled hydraulic cylinder. Optional equipment includes portable equipment, mineral filler attachment and an electric timing and locking device. A Model 4816-P package dryer unit or 6024 dryer, dryer feeder unit and dust collector may be added to make a complete bituminous mixing plant.

Two-Way Radio

THE GENERAL ELECTRIC CO., Syracuse, N. Y., has announced a line of FM mobile and base station two-way radio communication equipment, designated the "Progress Line," for both 25-54 and 144-174 megacycle land-mobile services. Featuring the use of plug-in chassis, the line is designed around 12 basic "building blocks" of standardized physical dimensions, so that the equipment is interchangeable with other units of its type mounted in either a base station or mobile housing. The basic pieces consist of two receivers, four transmitters and six power supply chassis, from which 60 different mobile two-way radios may be had by combining the appropriate units.

The housings are dustproof and feature drawer-type construction with lift-up covers. Support for the chassis in the mobile housings is supplied by an internal relay rack style construction. Standard dimensions of the housings are 6¾ in. high and 14⅞ in. long, while the widths are 14⅜ and 17⅜ in.

The receivers operate from either a 6 or 12 volt d-c. source or from a 117 volt a-c. power supply without modification, and are available for wide or narrow band operation. Only one RF stage is used in the high band receiver, and delayed automatic gain control has been provided so that full RF gain is possible for reception of

threshold signals, and to reduce high level intermodulation interference. An audio volume control provides full control of power output, and balances out hum noise pickup while eliminating inter-action between squelch and volume controls.

The transmitter chassis may be used in mobile or base station combinations interchangeably. In 25-54 mc. band, a medium power unit having 27 - 33 watts output and a high power unit having 54 - 82 watts output are available. In the 144-174 mc. band, a medium power unit with 20 - 25 watts output and high power unit 40 - 50 watts output are available. Sufficient reserve drive allows the multiplier stage output to drop ten to one without affecting the RF power output. A double triode modulation limiter and triode phase modulator combination are used to provide protection against overmodulation. The audio amplifier stages are designed to take the input of a controlled reluctance microphone. Carbon type microphones may also be used, although their inherent greater intermodulation distortion makes them less desirable. A neon lamp tuning indicator shows the relative amount of RF present in the antenna circuit and indicates adjustments for maximum power as well as power amplifier plate tuning. A fixed bias and "tune-operate" switch have also been incorporated to protect the power amplifier tubes during tuneup.

Medium and high power vibrator and high power dynamotor power supplies are available for use in the mobile radio units. To convert the mobile radios to base station units, there are medium and high power a-c mobile supplies. In addition a continuous duty base station receiver power supply uses a tapped, full wave bridge circuit with one transformer and one split reed, dual interrupter type vibrator plus industrial type, high temperature selenium rectifier cells. The high power uses the same type of circuit and chassis panel. Two transformers and two split reed, dual interrupter type vibrators are used instead of one each.

Grizzly-Feeder

SIMPLICITY ENGINEERING CO., Durand, Mich., has introduced an oscillating feeder with a grizzly deck, combining the dual operations of an apron feeder and grizzly. Double shaft assembly allows the unit to feed on the horizontal when headroom is at a minimum. Construction of the grizzly deck permits the use of abrasion-resisting alloys, and wearing surfaces can be equipped with replaceable liners. The unit may be spring-mounted, as illustrated, or with a spring and cable suspension arrangement. The grizzly-feeder is available in sizes from 2 x 8 ft. to 6 x 12 ft. and in capacities up to 1000 t.p.h.

Crane-Excavators

AMERICAN STEEL DREDGE CO., Wayne Shovel and Crane Div., has introduced a line of ¾-cu. yd. crane-excavators, with major wearing parts interchangeable. The clutch parts of the hoist drum assembly are interchangeable, right to left-hand position, and the reversing shaft clutch assembly is also interchangeable. Antifriction bearings are used on both assemblies. Other features include: a positive crawler lock and one lever steering control in the crawler model; a 19-ft. trench hoe boom which permits a 31-ft. 2-in. reach and digging depth of 20 ft. 5 in.; and accessibility of assemblies for maintenance. Models 70, crawler-mounted, 50A and 50B, truck-mounted, are available as a shovel, trench hoe, crane, clamshell and dragline.

Torque Converters

CLARK EQUIPMENT CO., Automotive Div., Falahee Road, Jackson, Mich., recently brought out a line of "Torcon" torque converters for heavy-duty, off-the-road vehicles, as well as for stationary power plants. The basic package consists of a standard, heavy-duty torque converter. Basic accessories included with the unit are a pump, cooler and pressure regulator. A "free wheel" mounting is offered as an optional feature, for the stator or reaction member, which is said to provide the desired torque multiplication under load. When the load decreases, and the speed increases, the torque multiplication drops to one and the unit acts as a fluid coupling. Torque converter units are available in 11-through 19-in. and 26-in. wheels. Of the single stage type, the line includes rated capacities from 30 to 600 hp.

Hydraulic-Lift Dump Trailer

CLEMENT-BRASWELL, INC., 505 First National Bank Bldg., Shreveport, La., recently introduced the Clement 500-H hydraulic-lift dump trailer series. The unit may be adapted to standard tractors or trucks, and is available in sizes from 10 to 25 cu. yd., single or tandem models. Controls for the hydraulic system are mounted in and operated from the cab. By locking the wheels on the tractor and telescoping the lifting arms, the trailer is drawn forward and into dump position. To spot dump, the trailer wheels are locked and the tractor backed as the hydraulic lift is telescoped. The independent movement of trailer and tractor is advantageous in getting the unit out of the hole in soft terrain.

Arc Welder

THE LINCOLN ELECTRIC CO., 22801 St. Clair Ave., Cleveland 17, Ohio, has brought out a universal, combination arc welder, designated the Idealarc, with a choice of either a-c or d-c

welding current, and either a soft or forceful arc. Continuous current control is provided through a rotating core in a separate control circuit, and open circuit voltage is switch controlled. For d-c welding, the unit provides d-c welding current through heavy duty rectifiers. Dual-control of the arc is provided, as well as selection of normal or "hot" starting by means of an "Arc Booster" switch. Models are available in 300, 400 and 500 amp. a-c combined with d-c capacities in 200, 300, 375 and 450 amperes. Units are also available in several combinations: as an a-c welder without d-c current to which a d-c package can be attached; and as a combination a-c and d-c machine with switch selection of either current.

Tractor Shovel

THE FRANK G. HOUGH CO., 705 Seventh St., Libertyville, Ill., has announced Model HFC "Payloader" tractor-shovel with a bucket capacity of 1-cu. yd. payload and ¾-cu. yd. struck load. It is a rear-wheel drive model featuring a self-cooled, three-element type torque-converter which automatically multiplies torque output of the engine in proportion to load requirements. The torque converter also acts as a cushion or shock absorber for the power train. The transmission is of the full-reversing type, with four speeds forward and four reverse up to 28 m.p.h., and features interchangeability of parts.

Log Washer

EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines, Iowa, has introduced a heavy duty log washer, powered by a 150- hp. electric motor through an enclosed reduction unit. The paddles have replaceable shoes of Ni-Hard, nickel-chromium iron alloy. The shaft and paddles are 48 in. in diameter, tub width is 9 ft. 4 in., and length, 30 ft. The unit is rated at 150 t.p.h., although capacity depends on the size of material to be washed, and the amount of foreign matter to be removed. The unit can handle material up to 8 in. in diameter.

Car Shaker

SIMPLICITY ENGINEERING CO., Durand, Mich., has brought out a car shaker, 11 ft. 1 in. long, 4 ft. high and 5 ft. wide, designed to fit any size gondola. It is of stress relieved, welded construction, and weighs 9500 lb. The motor is enclosed in the unit and mounted on resilient rubber to reduce vibration to the motor. The car shaker features a two-bearing, single shaft gyrating assembly which transmits vibration to the car for discharge of granular materials, even when frozen. It is balanced for handling by an overhead crane or hoist.

Towboat

DRAVO CORP., Neville Island, Pittsburgh 25, Penn., has introduced the Ram 70-ft. towboat, for short and medium range towing, shuttling barges between terminals in river harbors, and handling non-self-propelled vessels on marine construction jobs. It has a rated engine output of 580 hp., and the hull and superstructure are of welded steel construction. Four main transverse and two longitudinal bulkheads subdivide the hull into water- and oil-tight compartments. A steel fender of bent plate, fitted at the deck line, protects the full length of the vessel and full width of the stern. Exhaust from the diesel engines discharges through two small pipes installed flush with the aft wall of the pilothouse, thus eliminating a smokestack and permitting better visibility astern. Deck fixtures include a hand-operated capstan, two hand winches, a hand-operated boat crane, four 9-in. steel deck roller chocks, nine 36-in. cast steel kevels, and a double towing bit. The pilothouse, four staterooms, bath, galley, and mess room are accessible through internal passageways.

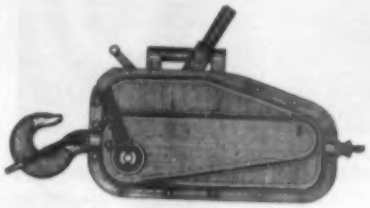
Bucket Loader

N. P. NELSON IRON WORKS, INC., 850 Bloomfield Ave., Clifton, N. J., has announced the Model B-68, a straight-line bucket loader, with a rated capacity of 10 tons per min. It features hydraulic crowd; power steering; hydraulic controls; 20 m.p.h. road speed; a 115-hp. engine; four-wheel drive with four-wheel booster brakes; Timken-Detroit axles front and rear; and maintenance accessibility. The chute discharges at a maximum height of 14 ft. 11 in., and the boom is raised and lowered by a twin-cylinder hydraulic boom hoist. The swivel chute, with two removable extensions, is adjustable from 30 to 50 deg. and swings hydraulically through a full 180-deg. arc.

Diesel Engine

CATERPILLAR TRACTOR CO., Peoria, Ill., has introduced a 125-hp., 1200 r.p.m., four-cylinder, four-cycle, valve-in-head diesel engine, designated the D339, which replaces the discontinued D8800. An engine balancer is incorporated to permit the four-cylinder engine to operate at 1200 r.p.m. with the same degree of smoothness as a six-cylinder design. A choice of three different types of starting systems is available: air, direct electric and gasoline engine. Electric starting for the gasoline engine is also available. The oil pump, driven from the balance drive, is a pressure bypass type. Most of the oil lines are placed within the

block, and a large oil manifold is utilized to reduce restriction from the oil filter base into the manifold. The fuel system includes a fuel injection pump, injection lines and capsule-type valves. A high capacity water pump and large cylinder block water passages have been added to maintain proper cooling standards. The standard engine has a governor which is said to provide 10 percent speed regulation between no load and full load throughout the entire speed range.



Portable Manual Hoist

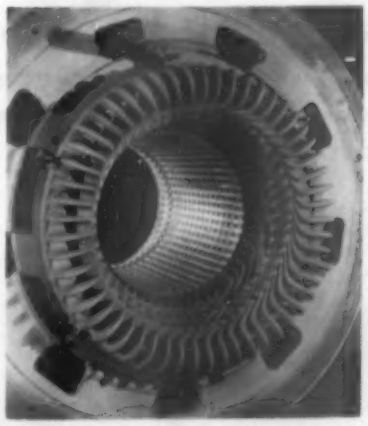
GRIPHOIST, INC., 700 Polk St., San Francisco 9, Calif., has announced the Tirfor manually operated hoist, rated at 3300 lb. at 10 f.p.m. cable travel. It is also said to handle loads of 6 tons or more by rigging it with pulley blocks. The unit uses a ½-in. wire rope of unlimited length, and combines the features of winches and chain hoisting devices. A crank and lever mechanism actuates two pairs of forged steel jaws which alternately grip and pull the cable. No manual effort is exerted to grip the cable, as the weight of the load actuates the jaws. The heavier the load, the tighter the grip. Precision control permits raising or lowering the load in increments of one-thousandth of an inch. The unit is 12 x 24 in., and weighs 42 lb.

Portable Crusher

BALDWIN-LIMA-HAMILTON CORP., Construction Equipment Div., Lima, Ohio, has introduced an Austin-Western, single-pass, diesel-electric portable crushing plant, which produces two sizes of material. Components are a loading hopper with grizzly, mechanical feeder, a double-deck inclined gyrating screen, 1024 roller bearing jaw crusher, 24-in. x 27-ft. delivery conveyor and an 18-in. x 20-ft. sand reject conveyor. The sand conveyor can be operated on either side of the plant. All components, except the crusher, are driven by individual electric motors, push-button operated from the operator's platform. The plant, which can also be furnished with straight mechanical drive, weighs approximately 20,000 lb. It is mounted on a steel frame with rear dual tires, and requires a 45-hp. gasoline or diesel engine.

Galvanized Metal Coating

RUST-OLEUM CORP., 2799 Oakton St., Evanston, Ill., has introduced "Galvinoleum," a coating for galvinized metal surfaces, which is said to bond without etching prior to coating. The coating may be applied to new, old, previously painted, or partially rusted galvanized surfaces. It is available at brush consistency, and may be applied by brush or spray. For spray application, it should be thinned with Rust-Oleum 540 thinning oil. It comes in red, gray, metallic or green colors.



Silicone-Insulated Motors

THE FIRST ALL-SILICONE-RUBBER INSULATION system for large motors and generators was announced at a joint press luncheon March 30 by Allis-Chalmers Manufacturing Co. and Dow-Corning Corp. Known as the Silco-Flex system, it is now available for all class H insulated form-wound coils and for class A and B windings operating under certain service conditions.

Using as its basic material Dow-Corning's Silastic silicone rubber, all the known advantages of silicone base insulations including thermal endurance and moisture resistance have been made available by Allis-Chalmers with the flexibility and resilience of rubber. Silicone rubber is applied to conductors and vulcanized to produce a sealed, impervious dielectric barrier continuous around the coils and leads.

Among advantages claimed are high heat and moisture resistance, great abrasion resistance, high ability to withstand mechanical abuse and stresses resulting from overloading and rapid starts, chemical inertness and improved heat dissipation.

Use of this insulation increases the power per pound ratio of electric motors and generators, will extend their service life and provide increased overload capacity. In some applications normally requiring totally-enclosed frames, those of the semi-protected or open types may be adequate and motors, generally, will be able to work harder without getting so hot as others.

Large units in the 2300-volt and 4000-volt insulation class (200 hp. and larger) are now being built of the new insulation by Allis-Chalmers, at no price increase, and the insulation is expected to be applied soon to a wide range of motor types and ratings.

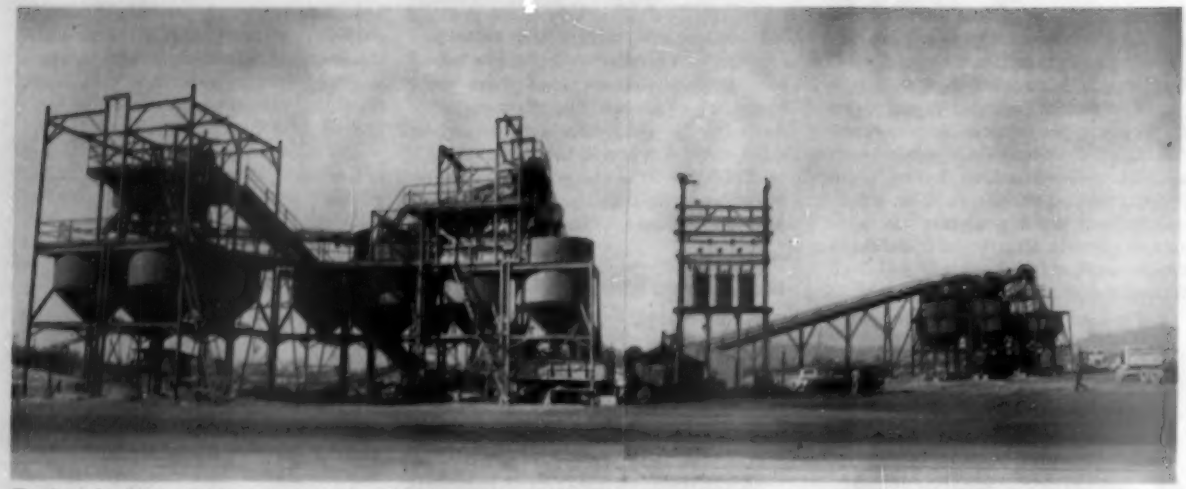
The above illustration shows a stator for a 2500-hp. 2300-volt, 3580-r.p.m. squirrel-cage induction motor wound with Silco-Flex all-silicone-rubber insulation.

Snap-Open Multiwalls

HUDSON PULP AND PAPER CORP., New York, N. Y., has developed "Snap-Open Sack" multiwall bags, featuring a series of small perforations in one corner of the bag under the tape and near the sewing line. The bags may be opened for controlled spout pouring, or torn along the entire length of the sewing line. The bag is also available in open-mouth and valve types.

Diesel-Electric Cranes

INDUSTRIAL BROWNHOIST CORP., Bay City, Mich., has brought out a series of diesel-electric rubber-tired wagon cranes, the first of which was shipped to a large western sand and gravel producer. The wagon cranes are available in 25- to 60-ton capacities, mounted on a 12-wheel crane carrier capable of speeds up to 8 m.p.h. The unit is equipped with a 60-ft. boom, dynamatic master clutch, anti-friction bearings in essential steering places, and it employs both electric travel and electric rotation. The diesel engine is rated at 165 hp. at 1800 r.p.m.



To the left: Above bins may be seen 4- x 12-ft. and 3- x 9-ft. two-deck screens which prepare three sizes of gravel and some sand. **To the right:** Section of plant where concrete and masons sand are produced. Sand screws are mounted over bins, to the right

DUAL FUNCTION Sand-Gravel Plant

• Granite Materials Co., Sun Valley, Calif., produces variety of sizes with plant facilities arranged to process both washed and unwashed concrete and masons sands, and crushed and uncrushed gravel products

By WALTER B. LENHART

LOCATED AT SUN VALLEY, CALIF., in the San Fernando Valley, is the Granite Materials Co., one of the first California gravel producers to emphasize steel plant construction. It has been operating in this area since 1933. The plant output is delivered entirely by trucks, many of which are company owned. Although it is one of the few sand and gravel producers in California not in the ready-mixed concrete business, the plant does serve many concrete batching plants in the area as well as two bituminous material plants.

An interesting, unusual phase of the operation is the production of both a dry, un-washed concrete sand, and a washed concrete sand. Similarly a dry, un-washed masons and a washed masons sand are produced. To pioneers in the sand and gravel industry, this is possibly "old stuff" for many can recall when all sand was un-washed, but newcomers in the industry possibly take it for granted that all sand must be washed to make it salable. Sand with a little clay in it has certain stability factors; compacts better and has desirable uses for driveways, tennis courts, bridle-paths, walkways, and similar uses. The Granite Materials Co., finds it advantageous to supply their customers with any kind of sand they desire.

View of pit showing high banks and the pendulum belt conveyor system, below, with shovel loading movable hopper feeding conveyor

The pit at Sun Valley is about 200 ft. deep. Due to the type of material, the banks tend to remain nearly vertical. When working from a single bench, this high bank must be caved down so the company uses a "back-scratcher." This is a heavy flat piece of steel with knobs on its face and "claws" at the edges. A Northwest No. 104 crane operating on the rim of the pit drags the weight up and down the face of the pit to cave the material down to the 2½-cu. yd. Northwest shovel operating at the bottom.

The bank run contains small amounts of clay, but by selection at the plant,

the dry sands produced can have variable amounts of clay in it, high or low, so as to meet any particular need. In addition, by adequate washing equipment, the washed sand can be kept free from clay so as to meet any specifications. Eagle single screw washers prepare the washed concrete and washed masons sand. The sand preparation units have been in service about two years.

Belt conveyors are used throughout the plant, with one exception, and this is a small short bucket elevator that is a part of the crushed gravel section. Crushed gravel, prepared dry, can be kept separate from uncrushed. Uncrushed gravel is prepared wet.

Use "Pendulum" Conveyors

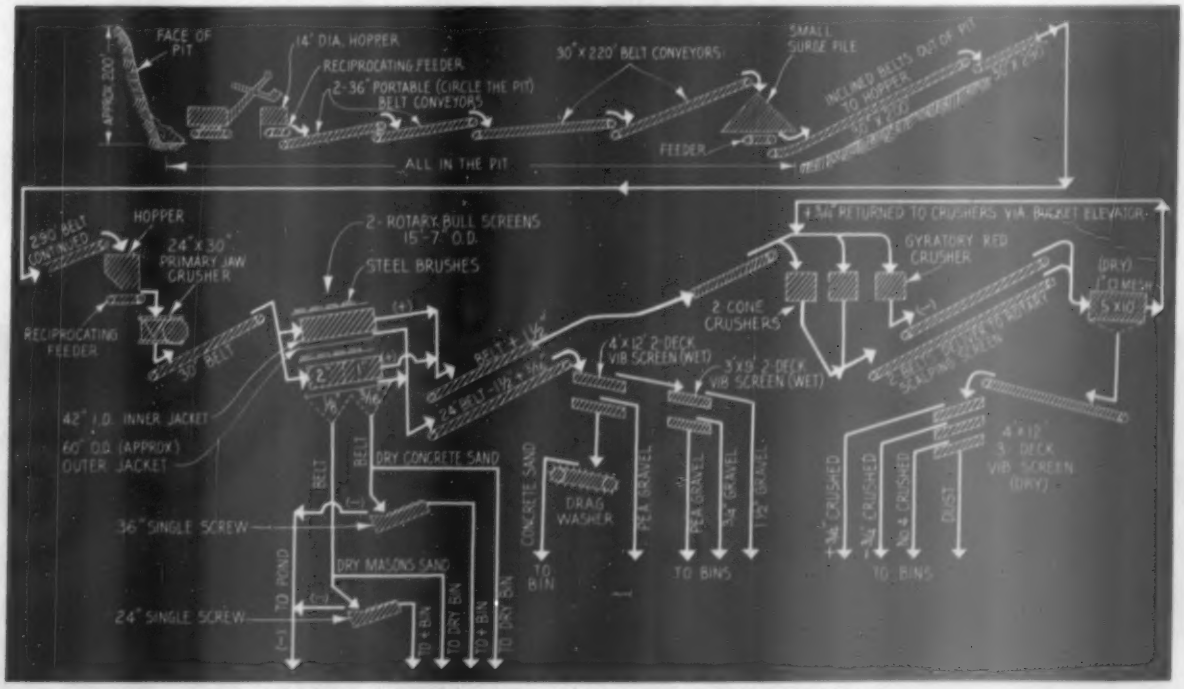
The Granite Materials Co. uses the so-called "pendulum" type belt conveyor in the pit. Under this operating technique, some operators use a long, wide, heavily constructed belt conveyor assembly on one end of which is fixed a loading hopper. The hopper usually has a grizzly on top of it, and a feeder under it to serve the belt conveyor. The shovel then "inches" the loading hopper or "can" around the pit in a semi-circle fashion. If the conveyor is 200 ft. long, a digging radius of 225 ft. can be obtained when the reach of the shovel boom is considered. At this operation, however, two 36-in. portable belt conveyors act as the "pendulum." From the two portable belt conveyors operated in series, longer belt conveyors deliver the material to a small surge pile located near the bottom of the pit. Reciprocating feeders are used on the "can" and under the surge pile. A second series of belt conveyors deliver from the surge pile to the primary crushing operation. All these belts, with the exceptions noted, are 30-in. Goodall belts are used for the most part, which ride on Stearns idlers.

Looking down at sand screws; to the left is the 24-in. machine for the production of masons sand, and to the right is the 36-in. unit for concrete sand

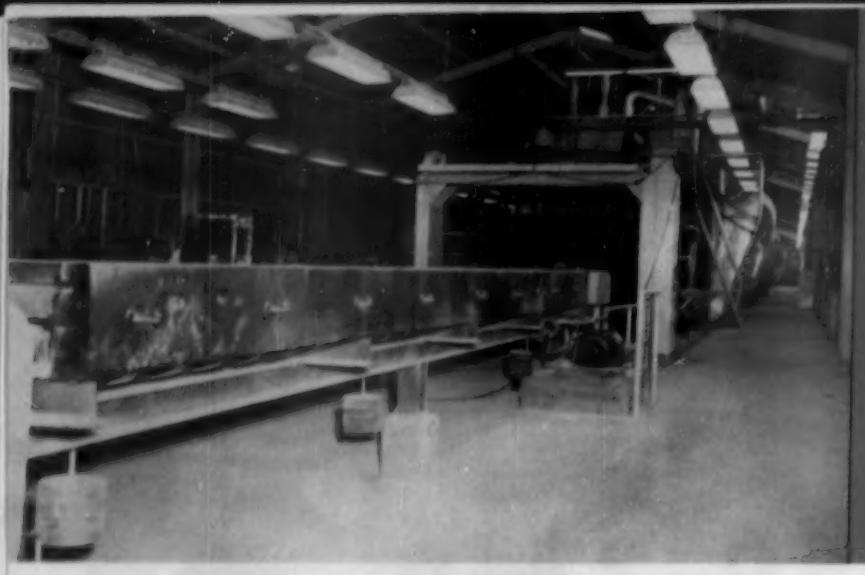
Crushing and Screening

After passing through a 24- x 30-in. Farrel-Bacon jaw crusher, the material is moved by belt conveyor with the load split to two dry, rotary bull screens. The outer jacket has four wire screen sections. The feed ends of this jacket are ⅛-in. slotted wire, and the remainder, $\frac{3}{16}$-in. slots. The inner jacket is designed to scalp out the plus 1½-in. that goes to the crushed gravel section. The minus ⅛-in. sand removed on the screens goes by belt conveyor to the top of the sand truck-loading bin section where the stream can be split, part of the stream going to the dry sand bin, and the remainder to a 24-in. single screw Eagle sand washer. Similarly, the dry concrete

(Continued on page 57)



Flowsheet of conveyor system, crushing, screening, washing and storage



By WALTER B. LENHART

Elevator and wallboard dryer at feed end of machine. It is on 8-deck, 361-ft. dryer

BLUE DIAMOND Boosts Plaster

AN EXPANSION PROGRAM has recently been completed by Blue Diamond Corporation at the Blue Diamond, Nev., gypsum and wallboard plant, representing an outlay of several million dollars. Blue Diamond is located 15 miles south of Las Vegas, on a spur of the Union Pacific Railroad which joins the main line at Arden. Wallboard, gypsum lath, calcined gypsum products; hardwall, un-fibered hardwall, finish, casting, and dental plasters are a few of the products shipped from the Nevada plant. Raw crushed gypsum is also shipped to portland cement plants in the southwest.

Mining and Quarrying Methods

Gypsum for the Blue Diamond plant is mined from a series of flat beds that dip and fold and are somewhat irregular. The beds are cut by ravines. The gypsum rock is pure white in color, hard and of high purity. There remains a multiplicity of openings from which rock was formerly secured, and until a year or so ago most of the rock was secured from underground workings using a room-and-pillar system of mining. Joy shuttle cars were used to transport the ore from the working face to the portal of the tunnel serving that part of the mine. The Joy shuttle is designed for operating where head room is low. It is a rubber-mounted unit and electric driven. The shuttle is still kept at Blue Diamond for any possible future underground work. Slushers were also used in the mine prior to the use of Joy equipment.

For the past year and one-half, gypsum rock has been mined by the open pit method, using a 1½-cu. yd. Link-Belt Speeder shovel that loads to rear-dump, Model 31 TD Euclid trucks. The trucks are powered by supercharged Cummins diesels equipped with oil hydro-tarders. The haul is about 1½ miles over relatively steep and rolling mountain grades. The Euclids travel these grades at 35 m.p.h. The company keeps two in service at the mine.

Overburden up to 30 ft. is a limestone formation that is drilled and blasted. About one cubic yard of stripping is removed per ton of gypsum mined. A Joy rotary drill is used for primary drilling, and in the overburden averages 30 ft. per hr. drilling a 6¼-in. hole.

New construction work at Blue Diamond starts with the mine where a 54- x 70-in. Jeffrey hammermill was installed. This unit takes any gypsum rock that the loading shovel can handle and in one pass reduces it to minus 2-in. Crude mine-run gypsum is dumped to a steel hopper with a Sheridan grizzly feeding the hammermill. The mill is powered by a 450-hp. slip ring induction motor directly connected to the shaft of the hammermill and

Left: A 1½-cu. yd. shovel loading a rear-dump haulage unit. **Right:** Buckets on 3670-ft. aerial tramway carry crushed gypsum rock to plaster and wallboard plant in the valley below

• Blue Diamond Corp., installs new primary hammermill in quarry, and adds three calcining kettles and two fine grinding mills at Blue Diamond, Nev. New wallboard plant has conveyor system equipped with recently developed electrical speed controls

Looking down 560 ft. long wallboard roller conveyor belt with dryer alongside

and Wallboard Capacity

it operates at 900 r.p.m. The crushed gypsum goes by belt conveyor to a hopper in the upper aerial tram terminal.

Use Aerial Tramway

The upper loading terminal of the aerial tramway, which is located on the brow of a steep mountain, is 900 ft. in elevation above the plant. The tramway is 3670 ft. long and comprises three sections with two anchor towers. There are 54 buckets on the line holding 0.87 tons each. The buckets are shallow, pan-shaped, and each have four grooved wheels that ride two parallel carrier, or sky-lines. The same wheels carry the bucket on the return lines where the bucket rides upside-down. The buckets do not disengage from the travelling line for loading or unloading. Currently the tramway is delivering 1250 tons per 8 hr. to the plant. The travelling line is 1-in. with a 1½-in. track cable for the loads, and 1-in. and ⅞-in. cable for the return buckets. The tramway was supplied by the Interstate Equipment Corporation and has been in operation several years. There are eleven towers with the longest span being 445 ft. The buckets travel at 370 f.p.m. and are filled continuously and automatically as they pass under a holding hopper at the loading terminal. They unload by simply passing over the lower terminal tumbler. Rope wear is confined mainly to the travelling line, and until recently the travelling line was bolted securely to the bottom of each bucket. When this assembly passed over either terminal tumbler it put a strain on the cable near the point of contact to the bucket. In an effort to eliminate this condition, the company recently fastened the travelling line to each bucket with two sockets each with eye-bolts. The eye-bolts fit into a clevice-and-pin fastened to the bottom of each bucket. This permits a little "give" in the assembly as they pass over the terminals. Loaded buckets descend by gravity with more than sufficient gravitational power to return the empties. Excess power developed by the tramway is dissipated by motor and a large fan at the upper tram terminal. Power generated by the motor is fed back into the service line. The motor and fan act as a brake on the aerial tramway system.

Crushed gypsum at the lower terminal can go to the grinding section, or, via a stacker belt be ground stored in a pile holding about 30,000 tons (total), or it can go to steel parabolic bins for direct loading to cars. The latter is mainly for the portland cement trade. Reclaiming from the stockpile to mill is via a tunnel in which a reclaiming belt conveyor operates. A tractor and dozer at times is used to push crude rock over the reclaim gates in the tunnel.

Plaster Mill Additions

In the plaster mill, three new kettles were added to bring the total to seven. All are Ehrsam kettles with a capacity

Left: Below hopper, to the left, is primary hammermill. Upper loading terminal for aerial tramway, to the right foreground. **Right:** Lower aerial tramway with surge pile, to the left

Left to right: E. D. Benton, plaster mill foreman; **S. W. Conner,** loading and warehouse foreman; and **E. J. Gutknecht,** wallboard superintendent

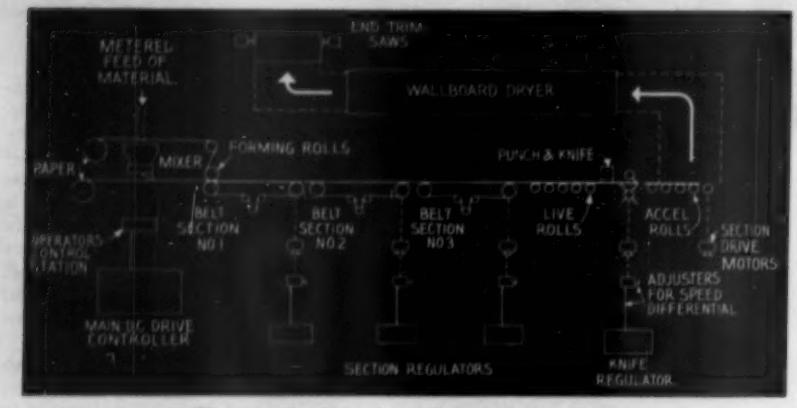


Diagram of wallboard and dryer production line

of 17 tons each. They are oil-fired using Ray oil burners. Foxboro recording thermometers are used for control of the calcining cycle. For fine grinding, two Raymond mills were added bringing the total to five. The company uses several burr stones as grinding in a burr mill is said to add desirable characteristics to certain grades of plaster.

New Wallboard Plant

A completely new wallboard plant was added to the Blue Diamond operation. The older board plant will be used mainly for the production of gypsum lath and sheathing. The new wallboard machine uses a series of three flat running belts and live rolls that are 560 ft. long from master roll to the cut-off knife. Dodge bearings are used on the carrier and return rolls. This section of the plant has a rated capacity of 300,000 sq. ft. of ½-in. board per 24-hr. day. Present production is 330,000 sq. ft. per day. The wallboard machine was designed and built by the J. B. Ehrsam & Sons Mfg. Co., and uses their pin mixer, punch, and cut-off knife. Rolls of paper used for the wallboard are placed in the tension racks by a Checo Load Chief traveling bridge electric hoist.

For drying the green boards, an 8-deck, 361-ft. enclosed Coe dryer is used. It is heated by steam coils from oil fired boilers, two of which are 450-hp. Babcock & Wilcox, one is a Union Iron Works 30,000 lb. per hr.

Burr stone mills are used for grinding certain grades of plaster

Part of the blending assembly where stucco and other ingredients are mixed on a volumetric basis

Some of the seven oil-fired gypsum calcining kettles

Top of one of the seven calcining kettles

unit, with a fourth boiler of 40,000 lb. per hr. capacity to be installed. The Coe dryer uses 30,000 lb. of steam per hr. The older gypsum lath plant has two Sterling boilers, and uses 27,000 lb. per hr.

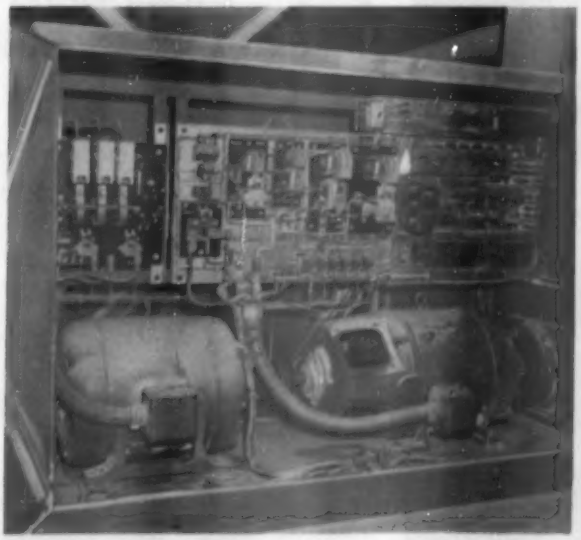
Stucco for the new plant is delivered by screw conveyors to four stucco silos each holding 100 tons. Screws from these silos deliver to a surge bin equipped with Hi-Lo bin indicators. Stucco from the surge bin is screw-conveyed to a constant head chute or bin with overage recirculated back to the surge bin. The constant head chute maintains a constant head on the feed screw to the pin mixer. All speeds are synchronized so as to provide accurate volumetric blending of the stucco to the pin mixer.

The new wallboard plant is housed in a steel and concrete structure that has 50,000 sq. ft. of floor space. Floors are kept clean by the use of a Wilshire power sweeper. A railroad car loading dock 760 ft. long parallels the new building. A high percentage of the cars loaded from the plant are flat cars with specially designed bulkhead ends. Loading is done by a fleet of three Hyster fork lift trucks with four Clark lift trucks for the lath. The flat cars, assigned to the Blue Diamond Corp. by the Union Pacific Railroad, shuttle back and forth from shipper to consignee. They have 79 cars for this service. Cars are loaded so they can be unloaded with equipment similar to that used for loading the cars. All cars are covered with a paper-cloth, water-proof fabric before leaving the plant. All products from the plant are marketed under the name "Blue Diamond."

Precision Control

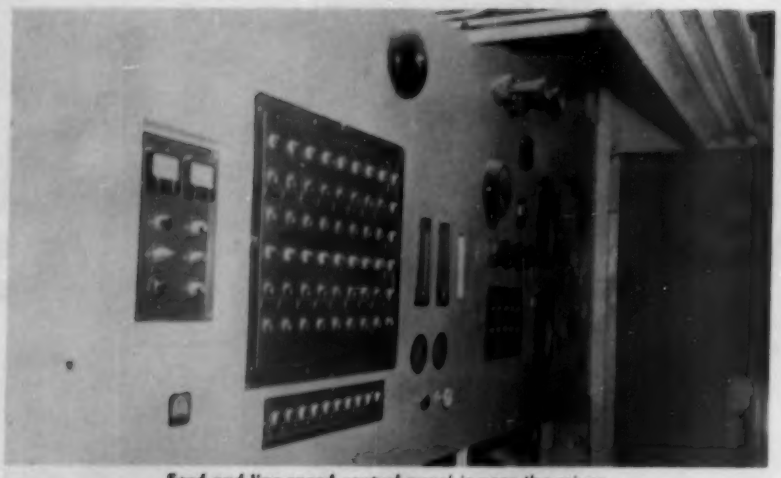
A feature of this wallboard plant that is new and unusual is the method of getting accurate control of the relative speeds of the three belt conveyor sections, and, an accurate cut in the continuous process.

Where more than one belt is used in a continuous process line many problems appear. For example, when the board passes from the first belt to the second, tension on the travelling board must be held to a low order. As the board is soft it will tear if the second belt travels too fast, and will tend to form a loop if too slow. In either event the board is ruined. Similarly, but to a lesser extent, this condition can prevail between the second and third belts, however, at that point the board has hardened somewhat permit-



Direct-current, adjustable-speed drive developed to provide synchronized speed for wallboard conveyor belts

No. 1 belt drive with section regulators mounted on back wall. In foreground is the variable speed transmission with individual synchronizer between two belts



Feed and line speed control panel is near the mixer

One of the two new fine grinding mills. Five are now in operation

Pin mixer feeds wet stucco to lower sheet of paper on the wallboard conveyor

ting greater differences in tension.

The speed of the travelling belt conveyor must be maintained at an optimum figure so as to get adequate production yet allow ample setting time for the stucco to set and harden. The line speeds must be easily adjustable at the forming end so as to match the volume of stucco from the pin mixer. Another important problem is to have equipment and means to accurately measure and cut the board to lengths within reasonable tolerances as the board passes through the knife section.

These problems were presented to the J. B. Ehrsam & Sons Mfg. Co., and through the Square D. Co., and the Century Electric Co., a direct-current, adjustable-speed drive was developed which has proven very satisfactory. By this system each belt section is driven by its own d.c. motor and gear reduction unit, all receiving power from a d.c. generator. Means are provided to maintain speed relationship of one section compared to the next. Control of slip is also provided for in this set-up.

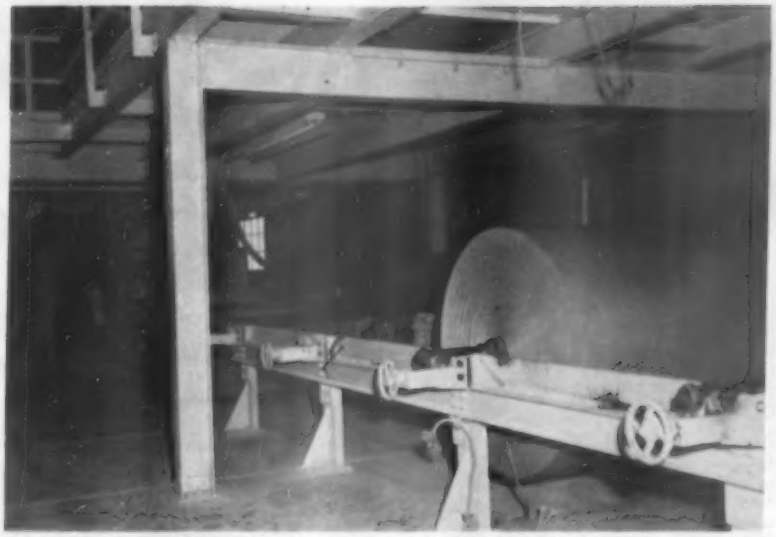
The knife unit, by the use of a metering wheel and the new electrical control, has resulted in accurate cuts in the 1/64-in. range with most cuts so accurate that differences cannot be determined by the use of a steel tape.

Near the plant the company maintains a cook house and sleeping quarters for the single men. More distant is the "Village" with family living quarters, trailer camp, and recreation in a valley where domestic water is obtainable. Power for domestic, mine and plant use is purchased from the Southern Nevada Power Co.

Personnel

H. L. Waldthausen is manager at the Blue Diamond plant. Ken Zahn is employe facilities manager; Marion Brooks, mine superintendent; and E.

Marion Brooks, mine superintendent



Tension devices on roll of paper at head of wallboard machine

J. Gutknecht, wallboard superintendent. R. S. White, is chief engineer; R. H. Whitney, quality control supervisor; E. D. Benton, plaster mill foreman; F. F. Day, maintenance superintendent; J. E. Carter, sacking foreman; and S. W. Conner is loading and warehouse foreman. J. H. Cain is assistant mine superintendent, and Woody Hodgson is office manager.

The head offices of the Blue Diamond Corp. are in Los Angeles. N. J. Redmond is president, and W. G. Bradley, vice-president in charge of operations.

Dual Function Plant

(Continued from page 51)

sand is moved on a separate belt conveyor to the same structure, the stream of material being split as desired, the dry portion falling to its bin, and the remainder to a 36-in. Eagle single screw washer. The Eagle washers are mounted on top of the cylindrical bins with the wash waters flowing back to a diked-off section of the pit. Purchased, metered water is used and none is reclaimed from the pit. All water sent to the pond seeps away.

The plus 1½-in. gravel from the two bull screens is re-crushed in three crushers; No. 636 and No. 322 Allis-Chalmers cone crushers and an Allis-Chalmers Newhouse reduction crusher. The throughs (minus ¾-in.) after re-screening on a 5- x 10-ft. rotary screen, operated dry, are sent by belt conveyor to a 4- x 12-ft. Stephens-Adamson three-deck vibrating screen (operated dry) and mounted over cylindrical bins. Four products are placed in bins: a ¾-in. crushed, a minus ¾-in., No. 4 crushed, and a crusher dust.

The minus 1½-in. plus $\frac{3}{16}$-in. from the two bull screens is moved by belt conveyor to a 4- x 12-ft. Stephens-Adamson two-deck vibrating screen that produces a washed pea gravel. Small amounts of residual sand remaining on the gravel from the dry bull screens is washed through the lower deck of the vibrating screen and recovered in a small sand drag that is mounted over the battery of bins. The over-size from the top deck of the screen passes to a 3- x 9-ft. Stephens-Adamson two-deck screen where a washed 1½-in., a ¾-in. and additional pea gravel is produced. These sizes go to cylindrical truck loading bins below. The plant has a capacity of 350 t.p.h. The flow diagram gives the essentials of the operation.

Ground stored material is reclaimed by two Link-Belt Speeders; a No. 70 has a 1-cu. yd. clamshell bucket and the other is a No. 90 with a 1½-cu. yd. clamshell. These are self-propelled units. In the yard are eight steel truck loading hoppers. The company operates 22 distribution trucks and trailers mounted on Fords, Reos and Internationals, equipped with Cook Bros. rear dump and telescopic bodies.

The offices of the company are at the plant. C. N. Newberry is president of the Granite Materials Co. and E. A. Wolfle is secretary and plant manager. C. Ray Moir is vice-president. R. W. Wamack is plant foreman, and Larry Hill, master mechanic.

Soil Stabilization

G. & W. H. Corson, Inc., Plymouth Meeting, Penn., has announced completion of about 50 different jobs on lime-fly ash stabilization by means of its patented process, Poz-O-Pac, as reported in *Limeographs*. The jobs include parking lots, driveways, airport runways, aprons to highway shoulders, bases on city streets, secondary roads and primary roads, and turnpikes. The overall tonnage of lime used in road construction is said to be expanding, and it has been estimated that the total amount of lime or lime-fly ash stabilization approximates 700 miles or 8,000,000 sq. yd.

Air Pollution Reprint

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, INC., has published a reprint of two papers on "The Magnitude of Errors in Stack Dust Sampling," and "A New Method for Stack Dust Sampling," by W.C.L. Hemeon and George F. Haines, Jr. The work reported in the papers is a part of a research program on air pollution being conducted by the foundation. Copies of the reprint are available without charge from the foundation at Mellon Institute, 4400 Fifth Ave., Pittsburgh 13, Penn.

Opens Gravel Quarry

FRANCIS AND LOUIS BATENHORST have started operations at a gravel quarry on their farm south of Cedar Rapids, Iowa.

Limestone Firms Merge

FARMERS LIMESTONE CO., and Baer Bros. Quarry, both of Appleton, Mo., have merged operations.

Close-up of section of plant where washed concrete and masons sands are produced

World's Largest Asbestos Block Caving Method

By MARION L. BRIGGS

White tower headframe of No. 1 main shaft is 129 ft. high. Of reinforced concrete poured with the use of sliding form in one continuous 15-day operation, it gives sufficient height to raise and lower man cage and ore skips from mine

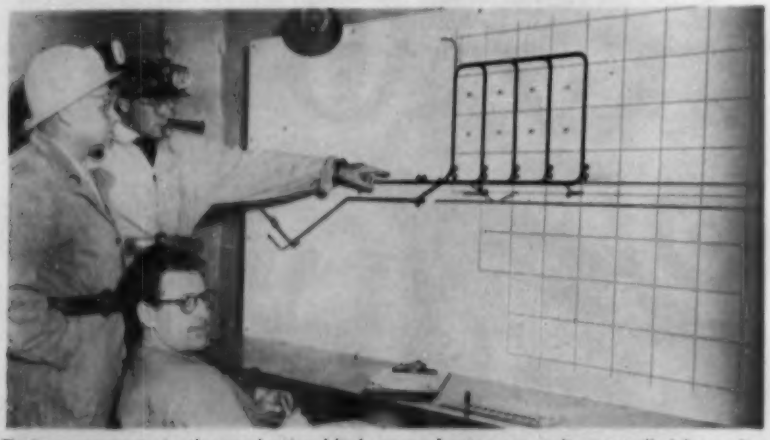
IN THE WORLD'S LARGEST ASBESTOS MINE, the Jeffrey mine of Canadian Johns-Manville Co., Limited, at Asbestos, Quebec, mining operations are being transformed by modern block caving methods. This mine produces 56 percent of Canada's asbestos output, but with the completion of its new mill in 1956, having an annual capacity of 625,000 tons, it will contribute more than a third of the free world's asbestos fiber.

Underground are 7.9 miles of drift at the 750-ft. mining level. This includes haulage drifts and crosscuts, ventilation drifts and slusher drifts. There are also 10.4 miles of sublevel drifting from the undercut level up.

Jeffrey mine lends itself particularly well to block caving, as the main ore body is a massive block — both horizontally and vertically — the horizontal dimensions being about 2700- x 2200-ft. It is shaped like a cylinder, tipping southwest, and is bounded on the north by a slate footwall with a 60-deg. slope. Veinlets of cross-fiber chrysotile asbestos in serpentinized peridotite form the ore, which contains little waste rock. Once the initial development work is done, the actual caving is relatively inexpensive as Nature does most of the work.

Reasons for Block Caving

To continue open pit mining beyond a certain point in the kind of ore body Jeffrey provides is not economically feasible. For the bigger the open pit gets, the farther the limits of the cone are off the ore body, and the more waste is involved on the sides. The quantity of waste rock involved, the slope of the pit, and the length of haulage roads out of it, set limits to the depth of the pit.



Train movements in the production block area of mine are radio-controlled by a dispatcher seated near the center of the haulage system. Panel shows plan of mining level with red and green signal lights

The decision was taken in 1942 to use block caving at Jeffrey to replace the open pit mining begun in 1881. No. 1 main shaft sinking started in 1944 and was completed three years later. Development of the 750-ft. mining level occupied from 1947-50. The first caving production came in February, 1950, and at present about 72 percent of all mining at Jeffrey is being done by this method.

The principal entrance to underground operations is No. 1 main shaft. It is about 1800 ft. from the south side of the ore body, and, besides a 750-ft. mining level, has an 816-ft. crushing station, a 940-ft. loading pocket, a 990-ft. spill station, and bottoms at 1000 ft.

Sinking of No. 2 main shaft began in February, 1953, and was finished in May, 1954. This is about 1000 ft. southwest of No. 1 main shaft, and connects with it at the 750-ft. mining level. It also has a 1150-ft. mining level, crusher levels at 816 ft. and 1216 ft., and loading pockets established at this shaft, which bottoms at 1413 ft.

No. 3 service shaft is one the north side of the main ore body and has a connection with the present 750-ft. mining level. It is the ventilation and emergency exit shaft for the mine.

No. 1 and No. 2 service shafts, from the open pit to the 750-ft. mining level, serviced a lot of the development work in preparing the first blocks for caving. No. 1 has been caved with the blocks, and No. 2 now serves as a fresh air inlet to the mine.

The shafts are supported by steel sets and poured concrete walls. The white tower headframe of No. 1 main shaft is 129 ft. high, and is made of reinforced concrete poured with the use of a sliding form in one continuous 15-day operation. It gives the height required to raise and lower the man cage and ore skips employed underground.

First Step in Block Caving

All blocks of asbestos ore are caved 200 ft. wide and 200 ft. long. Their thickness varies with the distance from the 750-ft. mining level to the uneven

Mine Uses

• Jeffrey mine of Canadian Johns-Manville Co., Ltd., at Asbestos, Que., will produce 625,000 tons annually when its new mill is completed in 1956. Underground are 7.9 miles of drift at the 750-ft. mining level

Combination trolley, battery-type electric locomotive pulling ore car train over 36-in. gauge track in continuous loop haulage system in mine

floor of the open pit above on which they surface. Currently ore is being drawn from six blocks, each containing some 1½ million tons of ore, at the rate of 2500 tons/day per block, when in full production.

The first step in block caving is to drive the crosscuts that run at 200-ft. intervals at right angles to the No. 1 and No. 2 main haulage lines at the 750-ft. mining level. Since present operations are mostly on the west side of the main ore body, the crosscuts run about 1200 ft. from east to west under the rock to be caved. They are driven with jumbo drills, employing 1-in. quarter octagon drill steel and detachable bits.

Inside their steel supports and concrete walls and backs, the crosscuts are each 8 ft. 4 in. wide and 9 ft. 6 in. high. The main haulage lines and haulage drifts have the same dimensions. Steel braces are 6- x 6-in. H-sections, with standard spacing of 6 ft. from center to center, except when poor ground conditions require it closer. Concrete supports are a minimum of 18 in. thick, and a 4000-p.s.i. concrete mix is used, without reinforcement or dowelling, and with a crushed limestone aggregate.

At 11 ft. above crosscut track level, and across the caps of the properly lined steel sets bracing each crosscut, a gangway 9 ft. high is excavated. This will connect slusher drifts to be driven at right angles to the crosscut at gangway level into the block of ore to be caved. Where each slusher drift will open onto the gangway, a 5- x 8-ft. opening is left in the 18 in. thick concrete gangway floor. This will permit loading of the caved asbestos ore into 10-ton cars coming in on the crosscut rails below.

The walls and roof of the gangway are of 18 in. thick concrete, and recesses are left in the walls at points where the slusher drifts will be excavated.

Slusher Drifts and Stations

Four slusher drifts are driven from the crosscut gangway on the south side of every 200-ft. square caving block, at 50-ft. intervals, for a distance of 103 ft.; and four are driven from the crosscut gangway on the north side of the block at the same intervals, but offset 25 ft. for a distance of 120 ft. This results in some overlapping.

A slusher station is cut off the gangway level on the opposite side of each slusher drift. As a result, the gangway connects the slusher stations, as well as the slusher drifts, and a man can go easily from one station to another to operate slushers in the drifts.

In excavating the drifts, a 5- x 7-ft. pilot drift is cut on the center line. At the halfway point, along the 103 ft. or 120 ft. length, the drift is slashed to its 13 ft. high x 10 ft. wide raw size for a length of 7 ft. From this station, 50 ft. to 60 ft. long slash holes are drilled longitudinally in both directions for enlarging the rest of the slusher drift to raw dimensions. Drilling is done with jackleg machines, using sectional steel.

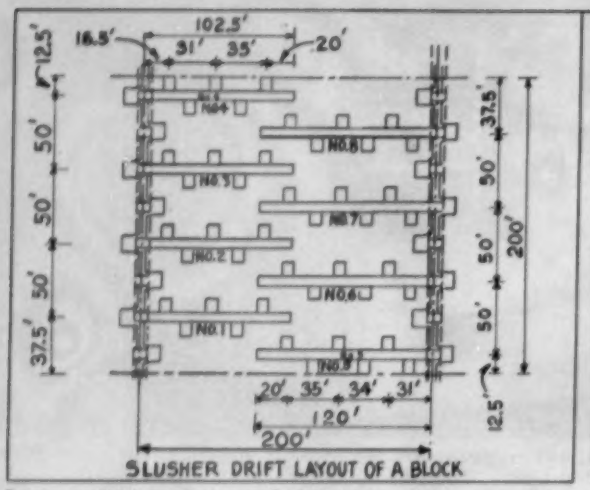
The lower third of the holes is then loaded and blasted, and mucked out with a 42-in. scraper and an air-driven slusher. Following this, the concrete floor is poured to facilitate slushing the remainder of the slash.

Next, the back half of the drift is blasted out to raw size. Muck is removed, and a prefabricated aluminum form, with truss-type panels clamped together for easy installation and removal, is introduced for use in concreting. The floor is concreted 1 ft. thick, the walls 18 in. thick, and the back 3 ft. thick, leaving the inside of the slusher drift 7 ft. wide and 9 ft. high. During concreting of the walls, recesses are left on alternate sides at intervals of 17½ ft. for the excavating of draw points.

At the end of 24 hr., the front portion of the drift is blasted and mucked out to full raw size. The aluminum form is then stripped from the back section of the slusher drift and moved to the forward half, then concrete is poured.

For wear purposes, 65-lb. rails are set in the front 20 ft. of the concrete floor of each slusher drift. At about 11 ft. from the end of each drift, high

Well-lighted lunchroom for workmen is located in the central 400-ft. protective pillar area at the 750-ft. mining level. It seats around 200, is decorated with green and white walls, and is furnished with tables, bench seats, and hot plates on the tables



Cross cuts divide ore body into 200-ft. blocks. Eight slusher drifts on 50-ft. centers draw from each block

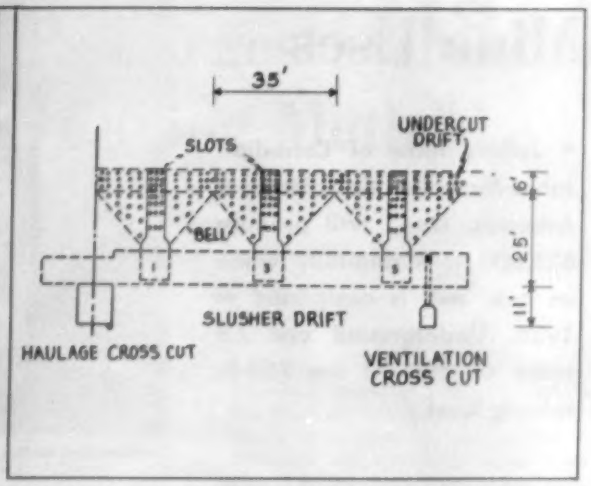


Diagram showing placement of holes for drawpoint excavation

up in one wall, a 20-in. diameter pipe is established for ventilation. This pipe connects with an exhaust air drift. And at the rear of every drift is a steel-faced concrete ramp, with a 45-deg. dip, to stop piling up of fines mucked back on return trips of the slusher drift scraper.

Draw points are staggered at 17½ ft. centers on each side of every slusher drift for drawing ore from the caving block above. Thus, if the first drawpoint is 17½ ft. in from the gangway on the left side of the drift, then the initial draw point on the right side would be 35 ft. in from the gangway, etc.

First the portals of the drawpoints are dug out enough to allow for pouring a minimum of 5 ft. of concrete for a brow. Then the floor of the drawpoint is driven upward vertically at 45 deg. for 11 ft. from a point about 1 ft. above the slusher drift floor, using stopers. The floor, walls and roof of the drawpoint are then concreted, all being poured together, leaving the finish drawpoint 8 ft. wide and 4 ft. 6 in. high, and at least 5 ft. long.

Undercut Drift

Upon completion of the drawpoints in a slusher drift, a steeply inclined raise is driven from one, at right angles to the slusher drift, to a point 22 ft. above the roof of the drift. Then, at a level 16 ft. above the back of the slusher drift, a 5- x 6-ft. excavation is cut along the full length of the drift. From this undercut level, an opening for ventilation and exit is drilled down to a second drawpoint.

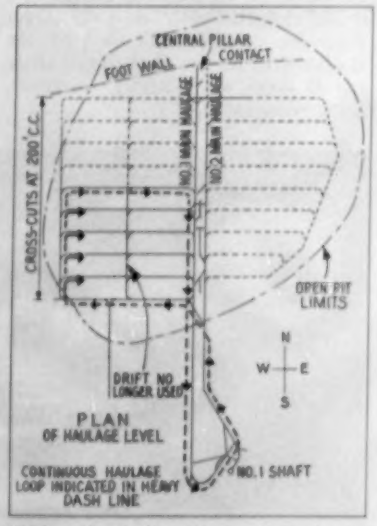
In undercutting, bells are opened over each drawpoint to the top of the undercut, wide enough to connect every one to its neighbor. The individual drawpoints in a slusher drift are prepared as self-contained blasts, and grouped for simultaneous undercut blasting.

To develop a combined drawpoint and undercut excavation, parallel fans of holes are slashed to a narrow vertical slot opened at right angles to the slusher drift. In each fan, holes are drilled horizontally to the limit of the undercut and downward to conform to each vertical section of the drawpoint bell. They are prepared for slashing to the vertical slot, retreating from the deepest near center to shallowest at the ridge between drawpoints

Undercut drilling is done with jacklegs, employing ⅞-in. hexagonal sectional steel and 1⅜-in. tungsten carbide chisel bits, and holes are drilled up to 25 ft. length. For the raise drilling, Leyner and sectional steel are used. A 25-ft. length of plastic hose blows out the holes, and sectional plastic sticks speed loading. Polar Forcite Gelatin 40 percent dynamite and millisecond delay electric blasting caps are used.

In bad ground, the undercut drift is supported with steel sets, and gunite is also used occasionally. Drilling is completed before blasting starts.

Natural caving of the ore rock may require several weeks. It takes place by doming and spalling upward in the ore block until it breaks through to surface. The rock breaks off a little at a time.



Haulage level plan showing how electric locomotives move ore from mine workings to the unloading tipple

Slushing

The drawpoints are watched carefully while Nature does her work to see that the ore block is pulled evenly. Slusher drifts are cleared of the entering ore with 125-hp. Joy or Rand electric slushers, using 1¼-in steel cable and a 6-ft. scraper, with either a 72-in. rigid or folding blade. The return cable goes around an 18-in. tail pulley mounted on a reinforced 14-in. H-section. The slusher drifts are lighted with sealed beam floodlights mounted on front of the slusher hoists. Operated electrically by remote control from the slusher stations, the slusher hoists have a rope speed of 260 f.p.m.

Loading and Hauling

The asbestos ore is loaded directly from the slusher drifts, through the gangway opening above the crosscut tracks, into 10-ton cars. Fifteen-ton Goodman and General Electric combination trolley, battery-type locomotives carry the production cars over the 36-in. gauge 85-lb. haulage system rails to the principal ore pass near No. 1 main shaft, where a tipple, rotating in a 360-deg. arc, dumps two cars at a time to the 816-ft. crusher station level below.

From the 48- x 60-in. jaw crushers,

with 8-in. discharge openings, the ore moves to storage bins that feed into a loading pocket. This, in turn, discharges to two measuring pockets. Next, the ore is raised to the surface in 12-ton Anaconda type skips operating in balance by push button control, and making about a maximum of 50 trips an hour to surface.

Train movements in the production block area are radio-controlled by a dispatcher seated near the center of the haulage system. Locomotives have warning sirens, and in the two main haulage lines there is provision for one-way incoming and outgoing traffic. In all, there are about four miles of track underground.

The No. 1 and No. 2 main haulage lines go on 100-ft. centers, parallel to each other, northward to the slate footwall boundary of the ore body through a central 400-ft. protective pillar that divides the entire ore body into east and west sections. Both these main lines and the haulage crosscuts are connected in a continuous loop transportation system by a perimeter drift at the 1200-ft. limits of the crosscuts. The No. 1 and No. 2 main haulage lines have steel and poured concrete walls and backs, except for less than a third of their length, which has steel supports and gunite backs and walls.

An average of 2400 hp. are used daily at a cost of $302 per day in underground operations. There are actually some 13,000 connected hp., including 2100 hp. at No. 2 main shaft.

Provisions for Ventilation

Fresh air is brought down No. 1 and No. 2 main shafts and No. 2 service shaft, and is distributed throughout the working areas. It is then drawn into exhaust drifts connected to a 250,000 c.f.m. exhausting fan at the collar of No. 3 service shaft. Two 75,000 c.f.m. fans are held in reverse as standbys. One can be used to reverse the air flow in No. 2 service shaft if icing occurs in winter. Underground temperature is maintained the year round from 45 to 50 deg. by these controls.

About 160 hourly employes per shift work in the underground mine, and they put in a 5-day, or 40-hr. week. For total underground operations, a staff of over 550 is currently required.

Located in the central 400-ft. protective pillar at the mining level — besides storage room for day-to-day equipment, repair shop for on-the-job repairs, and sanitary stations — is a modern, attractive lunchroom. It seats around 200 people, is decorated with green and white walls, and is furnished with tables, bench seats, and hot plates on the tables.

Rocky's Notes

(Continued from page 32)

bers 40, 42, 43, 44, 46 and 48, although ^{40}Ca comprises 96.97 percent of all the calcium in Nature. Aluminum has only one isotope. Magnesium has three isotopes with mass numbers 24, 25 and 26. The common one is ^{24}Mg but 21.40 percent of the magnesium in Nature is of the other two isotopes.

The principal chemical properties of atoms are determined by the nucleus and the outside orbital or surrounding electrons, but there are appreciable differences in some chemical properties of the isotopes of the same element, particularly in the lighter elements and their compounds. For example ^1H_2O and ^2D_2O, while both water, do have some quite different properties, or characteristics. It is not known, of course, at this stage of knowledge of nuclear chemistry, if such differences in the isotopic forms of silicon or calcium, for example, would have any influence on chemical reactions that occur in a rotary kiln.

Making and Unmaking Elements

It is evident from what has preceded that an element remains practically the same chemically so long as the number of protons (and electrons outside the nucleus) remain the same. Isotopes of the same element are made by adding or taking away neutrons from the nucleus. This goes on in Nature in many instances and accounts for the radio-activity of some of the elements, of which uranium and radium are the commonly known examples. These changes in the nucleus are accompanied by the absorption or release of energy, for the nucleus is always trying to arrive at its most stable state. The changes can be carried so far as to change one element into another, when the number of protons is affected.

In contemplating how or why the interior of an atom may be changed we quote from the first chapter of the book: "Because the nucleus and the electron are very much smaller than the atom as a whole, it is obvious that the actual volume of matter in an atom is only a small fraction (in fact approximately 10^{-12}) of the total volume of the atom. Therefore an atom is mostly empty space that is readily penetrated by rapidly moving particles such as electrons." Now 10^{-12} means $\frac{1}{1,000,000,000,000}$ of the solid matter in an atom is only one trillionth of the volume of an atom! A very small fraction indeed.

There are several ways of adding to and subtracting from the various interior particles of the nucleus of an atom, some of which are, of course, employed in the manufacture of fissionable uranium and other heavy elements used in the making of A-bombs. In the manufacture of H-bombs, the process is reversed, and under tremendous heat and pressures heavier atoms are built up. H is converted to $^2D_2$ and $^2D_2$ to ^4He (helium) with the release of the tremendous energy originally required to hold the atoms of hydrogen apart. For example, from this book on Isotope Geology, we learn that "the total energy obtainable from the oceans in the reaction $4^1H \rightarrow {}^4He$ would be 10^{60} erg, or enough to raise the temperature of the Earth 2.7×10^{9} deg. K. (absolute temperature measured in Centigrade degrees) — 2.7 x 1,000,000 or approximately 2,700,000 deg. Our author says also: "It is unlikely, however, that even in an ocean consisting of heavy water a self-sustaining thermonuclear reaction could be started by uranium fission acting as a trigger mechanism." That statement, we trust, makes the prospect of our Earth surviving man's experiments with H-bombs a little brighter.

Uses of Isotopes

We would not do justice to the author if we did not emphasize that the main purpose of the book, aside from explaining the whole theory of nuclear chemistry, is to show how isotopes are and can be put to many useful purposes. Probably this can best be done by listing some of the chapter heads: (1) Atoms, nuclei and nuclides; (2) the Periodic System of the elements; (3) isotopy; (4) mass analysis; (5) radio-activity; (6) properties of nuclear radiations; (7) nuclear reactions in Nature; (8) geological applications of radio-activity; (9) abundance and origin of elements and nuclides; (10) general possibilities of isotope fractionation in Nature. Part II of the book comprises detailed descriptions of all the nuclides that occur in Nature and the present theories to account for them.

The rates of radio-activity, or the rate of decay of certain elements, are used, for example, to estimate the age of the Earth, and even of the Universe as a whole. A good deal has been published about the use of carbon isotopes to estimate much shorter periods of time, as well as for much research in biology, since carbon is an element common to all forms of life. What isn't so well known is that radio-active isotopes have been employed in the exploration of holes drilled for petroleum. The possibilities of future applications of such isotopes appear unlimited. We have mentioned radio-active calcium in research on portland cement.

Removing Flat Stone With Special Screen and Crushers

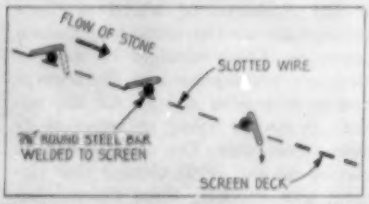
• Somerset Limestone Co., Inc., removes 50 ft. of overburden to reclaim 65 ft. of stone. Use millisecond delay blasting in difficult rock formation. Also operate "package" type bituminous plant

By WALTER B. LENHART

"De-flatter" screen above bin equipped to remove flat pieces

REMOVAL OF FLAT AND ELONGATED PARTICLES from aggregates has been a challenge to the ingenuity of operators and engineers close to the rock products industries. At the new plant of the Somerset Limestone Co., Inc., Somerset, Penn., flat pieces have been reduced from 60 percent for the No. 4 and 3A (Pennsylvania size designation) to 4 to 5 percent for the same sizes of stone. This method was worked out cooperatively by the company and A. R. Amos, Jr., Telsmith representative, Philadelphia, Penn. In the case of the Somerset Limestone Co., Inc., a so-called "De-flatter" screen is used.

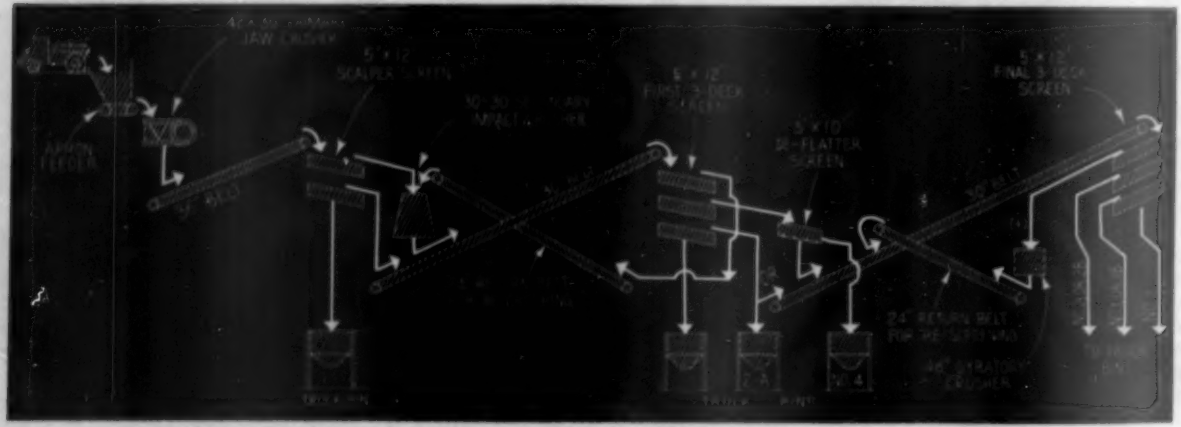
The up-ender technique is usually built around the use of a slotted cloth or punched plate with the slots running preferably at right angle to the flow of stone over the screen. Stone that has been through the primary, or the secondary, or both is better adapted to the process. This means stone approximately in the minus 5-in. to plus 3-in. range. Across the screen and at right angles to the longer dimensions of the screen are welded ¾-in. to ⅞-in. round iron rods. As the stone flows down the screen the flats tend to go over the obstructions and as they do so they are up-ended somewhat and thereby more easily received by the slot in the screen. The line sketch gives this technique of flat stone removal.



Sketch shows how steel bars welded to screen wire tilt up flat pieces so that they drop through

How Flats Are Eliminated

At Somerset the stone is first crushed in a jaw crusher. A scalper screen takes out the oversize and sends it to a Cedarapids 30-30 impactor. The scalper is a two-deck screen with material from the lower deck (fines) going to a bin. Throughs from the impactor and the material from the second deck of the scalper is transported by belt conveyor to a three-deck screen with the plus from the top deck returned by belt conveyor



Flowsheet of crushing and screening operations. Note how "de-flatter" screen fits in the plant flow

General view of plant from primary crusher to two screening and crushing stations

to the impactor. The material on the second deck of the three-deck screen is sent to the single-deck "De-flatter" screen. The material that is retained on this deck is acceptable for Pennsylvania No. 4 and is placed in bins as such. Throughs from the single-deck screen are mostly flats that have been removed by the de-flatter screen. They are sent by belt conveyor to a second three-deck screen (final sizing screen) where No. 2 or 2B, No. 1 or 1B, and No. 1 are screened out. These are all relatively small sized stone. The coarse material, which contains practically all the flats removed, is sent to a 48-in. Telsmith Gyrasphere crusher for a final reduction with the throughs from the 48-in. cone crusher returned by a short belt conveyor to the 30-in. belt conveyor that first received the flats. The flow diagram will give the essentials of the technique. It will be seen that the flats are eventually reduced to smaller sizes.

The "de-flatter" screen is a 4- x 10-ft. Telsmith Vibro-King, using slotted wire cloth with 1¼-in. by 6-in. slots and ⅜-in. diameter wire. The slots in this case have their long axis parallel to the flow of stone, or the long axis of the screen. No "up-enders" are used or required for the flats seem to tip and fall through the slots. The crushing technique in conjunction with the de-flatter screen has made acceptable a stone that otherwise was not satisfactory. The stone is referred to as "blue rock," and is a mixture of sandstone and limestone.

A second novel innovation at this plant is that the 30-30 impactor is driven by a single D-13,000 Caterpillar diesel. This is one of the early New Holland models with a flat belt wrap drive around each pulley and a snub. The later, more preferable drive, is with two power units and individual V-belt drives.

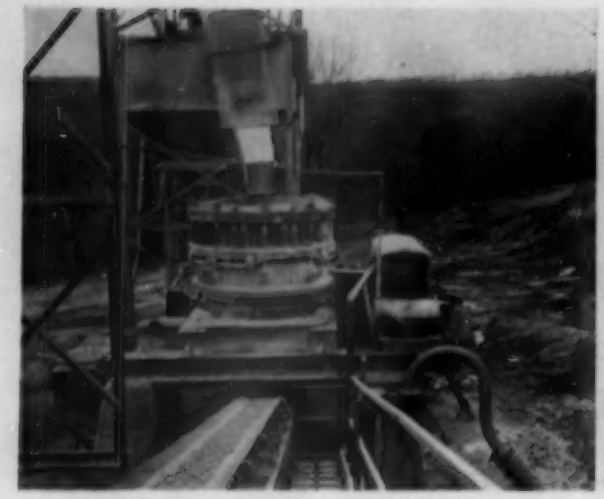
The wear on the impactor is such that it requires about 5 hr. welding per 9 hr. day of operation. This is not considered abnormal due to the silica content of the rock, and also because the impactor has considerable influence on the reduction of flats.

Diesel-Electric Power

The three crushers in the plant are driven by individual G.M.C. and Caterpillar diesels with a fourth diesel-electric set for producing power for the incidental motors; such as screens, conveyors, etc. These motors are in a straight line, possibly 500 ft. long, and receive clean air from a common pipe.

1¾-cu. yd. shovel loading haulage unit

Drop ball suspended from crane boom for secondary crushing



Gyratory type crusher driven by diesel

Impactor type crusher. Note pipe supplying air to diesel

This 18-in. corrugated pipe is buried in the ground. Its intake is several hundred feet away from the plant, and in effect is the short leg of a "T" as seen in the sketch. Each motor has a 12-in. corrugated pipe that connects with the main header pipe so that each motor gets clean air at all times.

Blasting Practices

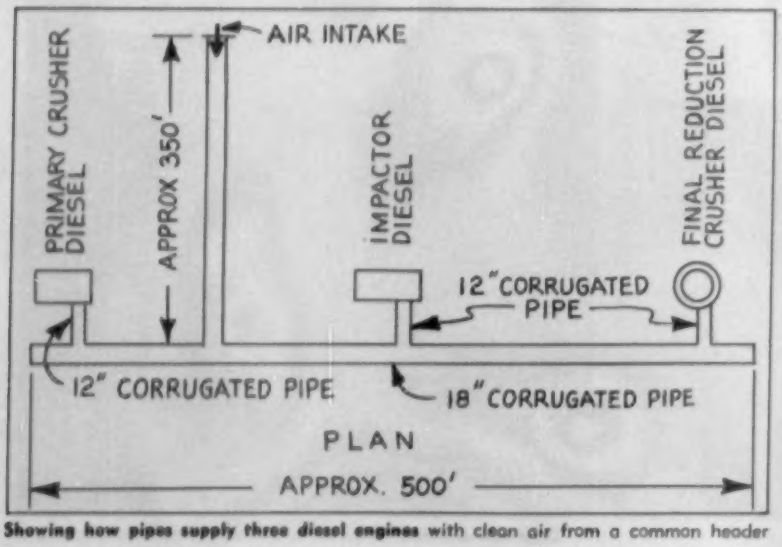
The quarry has several unusual features. The first is that 50 ft. of overburden is removed to get 65 ft. of stone. The first 2 to 3 ft. of overburden is removed by pans and dozers, but the remainder has to be drilled and blasted. It is more friable than the rock so lighter charges are used than for the rock below. Stripping is done in the winter, using shovels, Euclid haulage units and an 8-D Caterpillar with dozer. The acceptable stone in the face has vertical and near-horizontal seams with the rock tending to break in an irregular manner unless close spacing of the blast holes is practiced, along with toe and breast holes that are shot as helpers.

The toe holes are spaced on 5 to 8-ft. centers and are drilled with a Cleveland wagon drill to depths from 20 to 30 ft. The toe holes pitch downward slightly. About 3 ft. above the row of toe holes, a row or horizontal breast holes is drilled, using about the same spacing and hole depths. Next, about 5 ft. above the horizontal holes a third row of holes that pitch upward is drilled. These are shot along with the vertical holes. The top row or breast holes uses No. 4 delays; the middle row, No. 5 delays; and the last toe holes, No. 6.

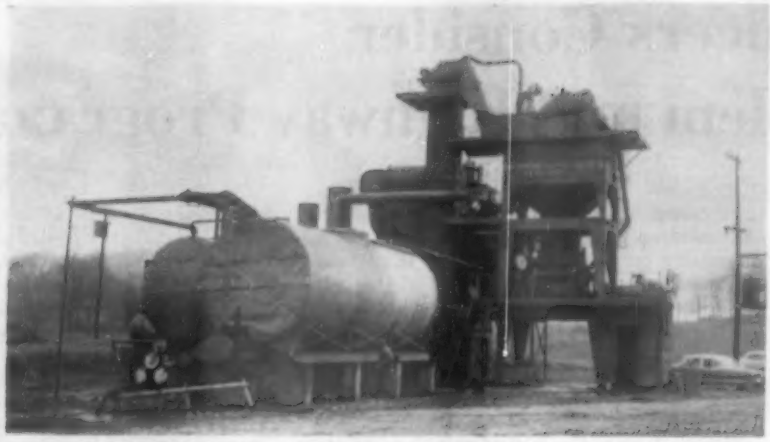
Vertical holes are shot using delays Nos. 1, 2, and 3 at the same blast with the outer of three rows of holes having the No. 1 delays, the middle row the No. 2 and the back row the No. 3. The first row of holes has a 3-ft. burden, the second row a 5-ft. burden, and the back holes another 5-ft. burden. The hole centers vary from 5 to 8 ft., depending upon mud seams. All are loaded with either Hercules or Trojan powder; 60 percent dynamite with 1½- x 8-in. cartridges. At one blast, using the above technique, 5000 tons of broken stone was secured from 1900 lb. of explosives. A Northwest drop ball does the secondary breaking using a 4200-lb. Cape Ann drop ball. The company is a wholly owned subsidiary of the New Enterprise Stone and Lime Co., Inc., with several quarries in southwestern Pennsylvania.

The parent company, including the Somerset operation, has six crushed stone plants and three asphalt plants. The crushed stone plants are at Roaring Springs, Canoe Creek, Oribisonia, Ashcom, and McConnelstown, all in Pennsylvania. The main offices are at New Enterprise. At Roaring Springs, the parent company has an Amiesite plant, a ready-mixed concrete operation, and it is the headquarters for the Equipment Control, the Black Top and the Contract Divisions. All equipment used at the Somerset operation is rented from the Equipment Division just as though the two affiliates had no interlocking interests. Each plant has a shop but major repairs are done at Roaring Springs, and the parts room is at that location.

The crushed stone plant is located about 10 miles west of Somerset with all stone hauled by trucks. At the height of the season up to 80 trucks are in service for customer duty. Of this total, about 12 trucks are company-owned. The plant has a capacity of 1200 tons per 9 hr. day and all screens operate dry. No railroad serves the plant. The company erected the



Showing how pipes supply three diesel engines with clean air from a common header



Bituminous mix plant uses a substantial part of the plant production

plant with Mr. Long acting as construction superintendent. The plant was designed by A. R. Amos, Jr., who supervised its construction.

Bituminous Plant

Near the edge of the town of Somerset, the company has also installed a new Hetherington & Berner black top plant that uses a 2½-cu. yd. mixer. It is a "packaged" plant complete with dust collecting equipment and a final wet scrubber so that no dust escapes to the atmosphere. Asphalt in the storage tanks is heated by hot oil coils using a Highway Machine Co. oil heater that is automatically fired by a Webster Electric Co. fuel unit. Howe dial scales are used as a part of the aggregate weight control set-up with a Hetherington & Berner Fluidometer for asphalt control. A Hopkins, 4-outlet burner is used on the dryer. This permits the use of one or more burners, depending on the tonnage being dried and its moisture content. Rescreening is done with a Diester vibrating screen over bins that serve the weigh batcher. The mixer uses a 75-hp. Louis Allis motor. The fan serving the rotary dryer is a 25 x 25 x 10, Hopkins Volcanic Specialties, Inc. unit powered by a Louis Allis motor. The plant is of steel construction throughout, very compact and built for high capacity and low operating costs. Trucks will deliver all materials to the new plant.

Paul I. Detwiler is president of the Somerset Limestone Co., Inc. Dale W. Detwiler is vice president, C. Galen Detwiler is secretary and Emmert I. Detwiler is treasurer. Charles Brown is operations supervisor for the New Enterprise Stone & Lime Co., and J. R. Long is plant manager.

A.S.T.M. Committee Activities

THE VARIOUS COMMITTEES of the American Society for Testing Materials having to do with rock products met in Cincinnati, Ohio, the week of January 31 - February 2. The most important work of Committee C-1 on Cement was a vote to recommend deletion of the alternate strength requirements as now expressed in terms of tensile strength of mortar briquets. Based on a recent country-wide survey of strength tests made by numerous laboratories on many cements, a revision in the present compressive strength requirements will be recommended, most of the revisions being an increase in the strength requirements. There was considerable debate over increasing the compressive strength requirement. The only logical argument advanced in favor of it was that laboratory mortars are now machine mixed, and that such mixtures give consistently higher strengths than the previous hand-made mixtures. There was some thought that the revisions placed too much emphasis on early strengths.

Concrete and Aggregates

New projects underway in Committee C-9 on Concrete and Concrete Aggregates include preparation of a specification for natural pozzolanic materials for use in portland-cement concrete. In connection with this proposed specification, as well as with the new specification for fly ash (C 350 T), it is felt desirable to establish uniformity requirements on specific gravity of the materials; and an industry survey will be conducted to obtain information on fly ash.

A proposed specification for packaged dry materials for concrete and mortar was accepted for distribution to the committee and for publication in the *A.S.T.M. Bulletin* as information. This specification will cover the production, properties, and packaging of dry combined materials for concrete, concrete mortar, and masonry mortar. Most of this product is now promoted and sold under the trademark "Sakrete."

Lime

Among the activities of Committee C-7 on Lime are the following: A proposed specification for lime and limestone for use in glass manufacture is being considered, involving four types of glass useage; namely: optical, plate, sheet, and bottle glass. A specification for precipitated calcium carbonate is also to be considered after definite need is established for such a standard. The need for requirements for lime used in hypochloride bleach manufacture was mentioned, but insufficient knowledge of the requirements will necessitate further investigation.

A test procedure will be prepared and distributed to Committee C-7 for determining the neutralization factor in evaluating the causticity of lime. A need was expressed for a better method for direct determination of unhydrated calcium and or magnesium oxide in lime products with the versenate method still under consideration.

A new Subcommittee on Pozzolanic Materials was established, with Nathan C. Rockwood as chairman. It is realized that a considerable amount of preliminary investigation has been made and a survey of available information will be necessary. In this connection a symposium was suggested for presentation in 1956. The committee authorized a letter ballot on the combining of the two specifications for hydrated finishing lime, C 6 and C 206, under one designation.

Gypsum

The Subcommittee on Structural Products of Committee C-11 on Gypsum is concerned with the development of specifications for paper used in gypsum-board products, in which thickness and density are the principal requirements, as well as fire hazard. Subcommitte consideration is also being given to a method of test to evaluate mold resistance treatment of face paper on gypsum board. Two methods under consideration are the TAPPI Method T487 and the Buchman Laboratory (Bulab) Method. The recommendation will be made at the next meeting for inclusion of the preferred method in the present A.S.T.M. Standard Methods of Testing Gypsum Products (C 26).

Considerable attention is being given to aggregates as used with gypsum. It was reported that a research program is making progress using lightweight aggregate, in which four laboratories are conducting a test series.

Indiana Producers Consider Agstone Problem and Highway Program

PRODUCERS OF SAND AND GRAVEL AND CRUSHED STONE in Indiana and many from the adjacent states of Illinois, Michigan and Ohio attended the annual meeting of the Indiana Mineral Aggregates Association at the Claypool Hotel, Indianapolis, March 14 and 15. The business meeting on March 14 drew a good attendance as it dealt very largely with the urgent problem of ways and means of promoting increased sales of agricultural limestone.

The opening of the regular session by President Glen Bowen on March 15, was a continuation of the discussions which started at the previous day's business session with a conference on agricultural limestone. Ralph Simpson, engineer-director of the association, reviewed the agricultural limestone situation in Indiana. He referred to the so-called Limestone Bill which was introduced in the recent session of the state legislature. This bill stressed fineness of the product. After studying the problem, a committee set up by the legislature recommended that the specification remain as it is at present or 80 percent passing 8-mesh and 80 neutralizing factor. Mr. Simpson also referred to the Purdue report, Bulletin 329, and the AY 24 report brought out in 1954, which he considered of considerable value to the industry. At present the annual application of agricultural limestone in Indiana is at the rate of 1½ million tons whereas the application rate should be 3 million tons to keep up with soil needs. It has been estimated that 33 million tons are needed to take care of the deficiency.

The following panel discussed the agricultural limestone problem; Harry Moore, Soil Conservation Service; Robert Koch, executive secretary, N.A.L.I.; Fred O'Hare, Greencastle, Ind., banker; Kenneth Harris, County Extension Service; Herbert Hill, public relations consultant; and Geo. Enfield, staff agronomist, Purdue University. Len Stewart of Columbus, representing distributors of agricultural limestone operating 5000 trucks, also was present.

Robt. Koch led the discussion, pointing out that some of the differences in state specifications are accounted for by the character of the producer's operations in that area. He referred particularly to the eastern states where a finer ground product is made. Mr. Koch also mentioned the Wisconsin experiment where applications were increased up to 10 tons per acre with increasing crop yields. Dr. Enfield of Purdue agreed that there would always be variations due to character of the soils, but he did not believe that the university's report was too rigid in its application. He expressed the view that it might take ten years to really sell the farmer on the idea of adequate liming. Dr. Enfield said that there would be a limestone exhibit at the next Indiana State Fair with a map showing source of materials and samples of agstone. One of the best talks was given by Fred O'Hare, Greencastle banker. He pointed out that the industry has not done a good job of merchandising. He said that people do not buy things for what they are, but for what they will do. Truckers, he said, could be the industry's best salesmen. Credit is available for limestone and fertilizer sales. He said that his bank sends out men to take soil tests before a loan is made. Sometimes, he said, the bank recommends a larger loan so that there will be a proper return on the investment. Harry Moore of the Soil Conservation Service said that they are interested in stopping erosion, and one way is to get good stands of legumes and it takes agricultural limestone to produce good yields.

New Officers

Officers elected for the ensuing year are: president, Geo. Wheeler, Kirkpatrick Gravel Co.; vice-president, H. C. Gorman, Russellville Stone Co., Inc.; and treasurer, Myron G. Johnson, Merom Gravel Co. The following directors were elected: J. Henry Law, Western Indiana Gravel Co.; C. C. Irving, Irving Materials, Inc.; J. A. O'Connor, J. C. O'Connor & Sons, Inc.; E. H. O'Brien, Interstate Sand & Gravel Co.; Wm. Stonestreet, Stonestreet Gravel Co.; Max Radcliff, Radcliff & Berry, Inc.; Thos. J. Wheeler, Cave Stone Co.; Paul Seitz, May Sand & Gravel Co.; A. F. Dunkirk, Muncie Stone & Lime Co.; Dale Yeoman, Yeoman Stone Co.; and Edgar Mulzer, Mulzer Bros.

Highway Problems

"'Atomic Age' Highway Problems" was the subject of the afternoon session on the second day. F. F. Havey, engineer of materials and tests, State Highway Department of Indiana, described the Indiana Test Road construction which he later illustrated with slides. The highway is a flexible type pavement with a total thickness of 19½ in. based on a California bearing ratio of 5.5. Features of the construction include: stabilization of the top layer of the permeable subbase by incorporating limestone screenings in the amount of 70 lb. per sq. yd. to a depth of 2 to 2½ in.; spreading coarse macadam stone in one layer without forms; the use of a multiple shoe vibrating tamper on all granular layers; and the use of a heavy pneumatic compactor of 50 tons maximum weight for testing the solidity and compaction of each layer, including the subgrade proper.

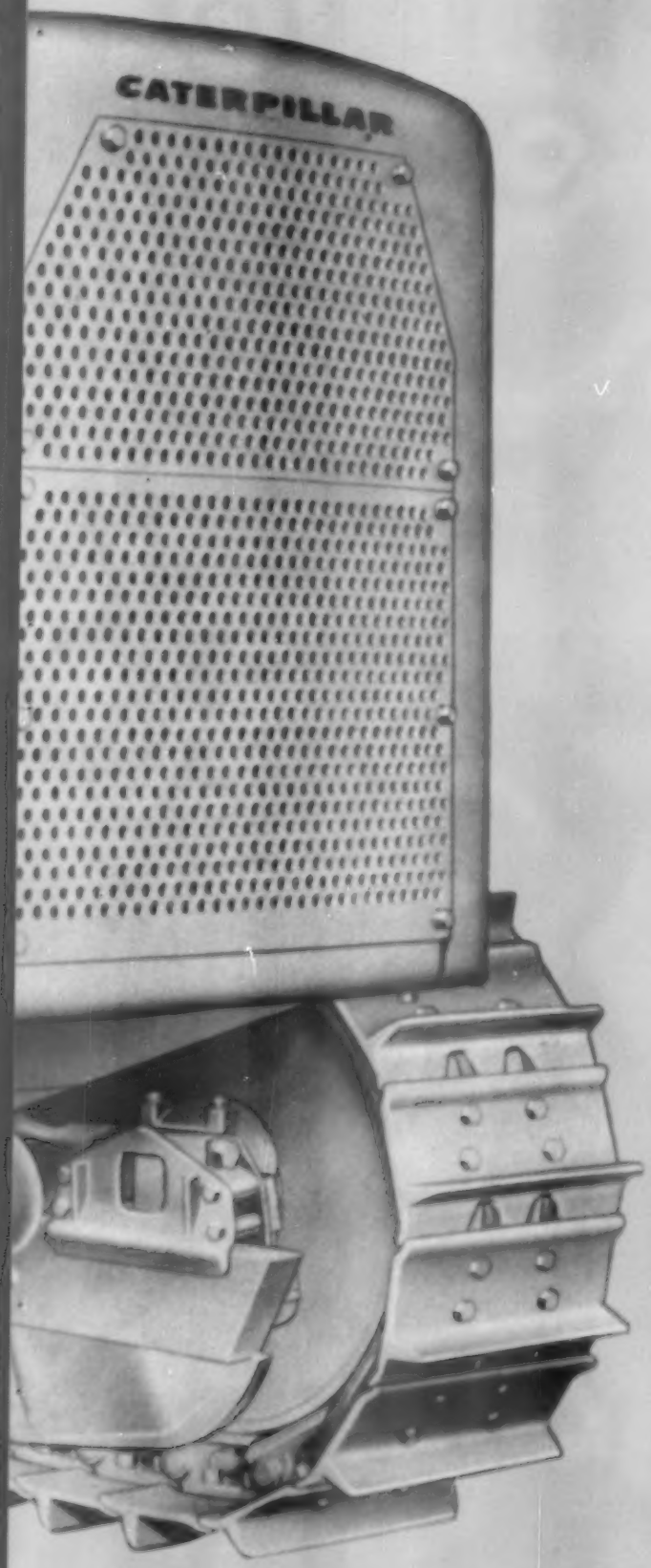
Two excellent moving pictures were later shown of the Indiana test road construction, one of the concrete and the other the flexible pavement.

"Safer Shoulders" was the subject of a talk by W. H. Sorrell, superintendent of maintenance, Indiana State Highway Department. Mr. Sorrell pointed out that roughly one-third of all highway funds go to maintenance, and 10 percent of the maintenance money is spent on shoulders. He said that penetrating grades of bitumen are used to get this material down 4 or 5 in. into the shoulder to keep water from getting under concrete pavements.

"Sand - and - Gravel Flexible Pavement Construction" was the subject of a talk by K. E. McConnaughay, civil engineer, McConnaughay Laboratories. This proposed pavement design comprises a ¾-in. wearing surface of No. 11 gravel or stone with 25 percent sand passing No. 4 mesh. The 3¼-in. binder course is followed by two 4-in. mixed-in-place asphalt base courses with 75 percent coarse aggregate consisting of 60 percent Indiana size L and 40 percent size U gravel or stone and 25 percent sand. The sand is a No. 14 natural sand with at least 10 percent limestone sand. Below these two courses is a 6-in. non-bituminous base laid in two 3-in. layers with the same kind of aggregate as in the previously described 4-in. bituminous base courses. The 4-in. minimum subbase is of dense-graded gravel, all passing a 2-in. sieve.

Deane E. Walker, member of the State Highway Commission, touched upon the impact of President Eisen-

(Continued on page 134)



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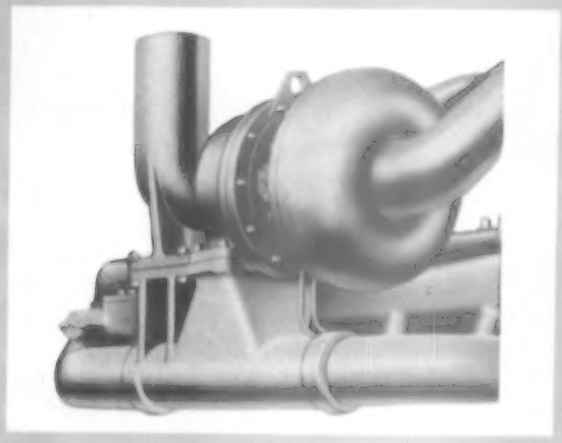
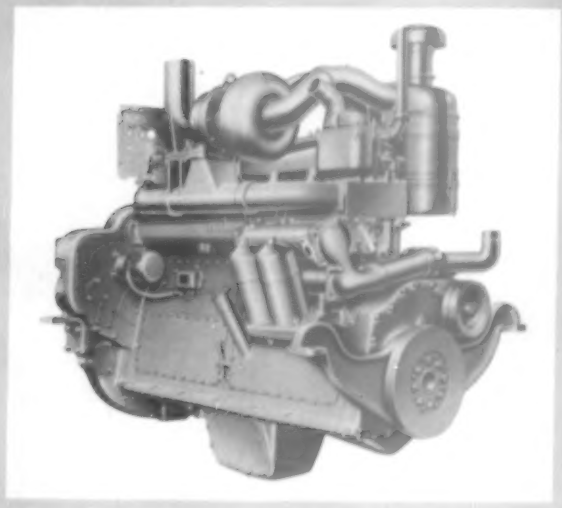


FIRST TRACK-TYPE TRACTOR WITH TURBOCHARGER!

The D9's new Turbocharger is driven by the engine exhaust, utilizing energy which would otherwise be lost. In addition, it packs air into the engine according to engine *load*, not speed. This means more working horsepower—greater performance.

CHOICE OF TORQUE CONVERTER OR DIRECT DRIVE!

Two types of drives are available, the exclusive Caterpillar oil clutch with six-speed (forward and reverse) transmission or a three-stage torque converter with 5:1 torque ratio. The transmission used with the torque converter has three speeds forward; two reverse. This option enables you to match the drive you want to your job requirements.



COMPLETELY NEW 286-HP ENGINE!

In addition to the Turbocharger, the powerful new D9 Engine features a 6¼" bore and 8" stroke and runs at 1200 r.p.m. Long life and dependability are promoted by stationary oil jet piston cooling; short, rigid valve push rods give smooth, accurate valve action; "Hi-Electro" hardened gear at the rear of the crankshaft drives timing gears and accessories; and many other advanced features.

WIDE RANGE OF OPERATING SPEEDS!

TORQUE CONVERTER:

3 speeds forward, 0 to 4.1 m.p.h., 0 to 5.7 m.p.h., 0 to 7.8 m.p.h.
2 speeds reverse, 0 to 4.1 m.p.h., 0 to 7.8 m.p.h.

DIRECT DRIVE:

6 speeds forward, 1.6, 2.1, 2.9, 3.9, 5.0, 6.8 m.p.h.
6 speeds reverse, same.

CONSTANT-POWER DRIVE FOR REAR-MOUNTED EQUIPMENT!

You always have power for cable controls, direct from the engine's rear power take-off. This makes cable control operation completely independent of flywheel clutch or torque converter and gives you a big boost in operating efficiency.

The D9 . . .
proven in the field for a year!

Though new, the D9 is already a veteran. After exhaustive proving-ground tests, several D9s have been tested for over 19,128 hours on the toughest jobs in logging, construction, mining and quarry work. These jobs tested every square inch of this mighty new machine. The word from the field: "By far the best big tractor ever made."

Rugged—
and easy to service!

From its one-piece welded steering clutch case-frame assembly, to its track shoes hardened by the "Water Quench" process, the D9 is the toughest crawler built. And it's designed for easy servicing. Oil clutch, torque converter, transmission case and steering clutches can each be removed individually without disturbing other components. Hydraulic track adjusters are among the many other features for fast, easy adjustment and service work.

Brief specifications

Length: 17' 10¾"
Width: 9' 11¼"
Height: 8' 9"
Gauge: 90"
Weight: 54,000 lb. approx., dry
56,200 lb. approx., operating

Easy to operate!

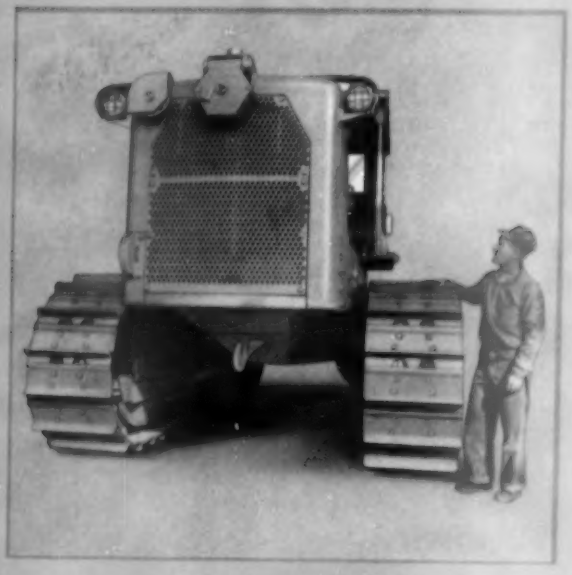
- The independent "live-shaft" drive for cable controls makes operation smoother, easier.
- Hydraulic boosters provide both power steering and power braking.
- Adjustable seat, all-around visibility, easy access to all controls make operator's job simpler.
- Important new 7-roller track frame improves stability, flotation and ride.
- New starting engine has electric starting system and simple single-lever control for easy operation from the seat and insures fast starts in all weather.

Equipment

New CAT*-built 'Dozers for the D9: the No. 9S Bulldozer, modified straight blade; the No. 9A Bulldozer, angling blade.

New Cat-built Cable Controls: the No. 29 rear-mounted, double drum; the No. 30 front-mounted, single drum.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



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New Study On Reactions In Burning Cement Raw Materials

By L. A. DAHL*

• The ternary system CaO-Al_2O_3-SiO_2 involves the three principal oxide constituents of portland cement. The phase diagram is studied with reference to the reactions which occur when ternary cement compositions are burned. Through this study some principles capable of extension to the commercial process of cement manufacture are demonstrated. These include the relation of composition to the proportion of liquid formed in the burning operation, the technical lime limit, and the influence of changes in composition on retention of clinker coating in the kiln. The influence of the burning and cooling operations on the constitution of cement clinker is discussed briefly. — *The Author.*

INVESTIGATION OF THE TERNARY SYSTEM CaO-Al_2O_3-SiO_2 was reported in 1915 by Rankin and Wright.[1] The paper was an outstanding contribution to the chemistry of portland cement, since the investigation was the first study of phase equilibria in the system involving the three major components of portland cement clinker. However, the principal interest to cement chemists at the time was not in phase equilibria at clinkering temperatures, but in the fact that three compounds, tricalcium silicate, dicalcium silicate and tricalcium aluminate, were found to exist in portland cement clinker. The present paper is concerned with interpretation of the phase diagram with reference to the reactions which occur during the clinkering process. The three oxides; lime, alumina and silica, constitute about 90 percent of the total composition of most portland cement clinkers. The components which make up the remaining 10 percent have large effects upon phase relations, and so it cannot be expected that this study of the ternary system will yield exact quantitive information concerning phase relations in the cement system. However, some general principles may be learned, and these may be understood more readily in a study of a ternary system than in a study of a system involving a greater number of components, requiring the use of a space model. A ternary system of the type under consideration may be represented in a triangular phase diagram. Interpretation of the phase diagram requires application of certain properties of the triangular diagram. These properties must be discussed before we can enter into a discussion of the particular phase diagram under consideration.

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Properties of Triangular Diagram

The properties of triangular diagrams which are used in a phase diagram and in its interpretation are properties of all types of plane triangles, scalene, isosceles or equilateral.[2] However, they have been frequently described as belonging uniquely to equilateral triangles. In this study it will be found convenient at times to connect points representing three coexisting phases by straight lines, and to treat the resulting triangle as a triangular diagram. Such triangles are practically always scalene. This mode of attack will be used repeatedly in the study of the system CaO-Al_2O_3-SiO_2. It is therefore deemed advisable to describe the properties of the triangular diagram in such a manner as to avoid the implication that they are limited to equilateral triangles.

The triangle ABC, Fig. 1, represents a ternary system A-B-C. The three sides represent binary systems, A-B, B-C and A-C. Each vertex represents 100 percent of the component indicated. The side opposite a vertex represents zero percent of the component at the vertex. For example, the side AC represents zero percent B. The lines parallel to AC represent percentages of B in 10 percent intervals, from zero to 100 percent. The percentages of A and C are similarly indicated by the lines parallel to the sides BC and AB. The sum of the percentages at any point is 100. For example, M represents 50 percent A, 30 percent B, 20 percent C.

Compositions in a binary system are estimated in a manner similar to that in a ternary system. For example, on the side AB, Fig. 1, which is a binary system, percentages of B are read from the zero point, at A, to the 100 percent point at B. Point N, therefore, represents 40 percent B. Reading in the opposite direction, point N contains 60 percent A, making a total of 100 percent.

A property of the triangular diagram which is frequently found useful is illustrated by the broken line AP in Fig. 1. All compositions on a line drawn from a vertex to the oppo-

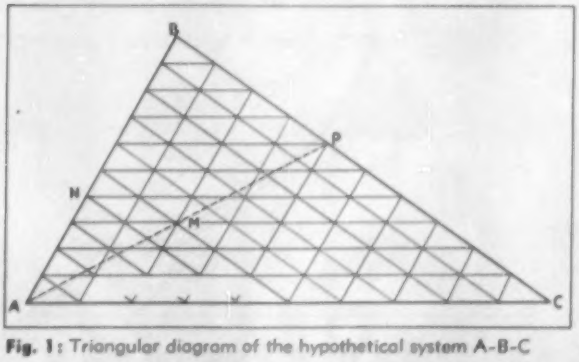


Fig. 1: *Triangular diagram of the hypothetical system A-B-C*

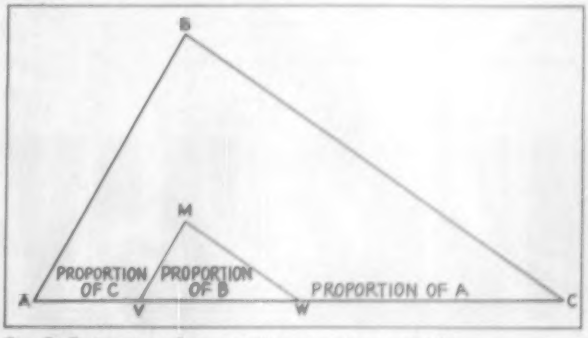


Fig. 2: *Estimation of composition at a given point M*

site side contain two of the components in the same relative proportions. For example, the percentages of B and C at M are 30 and 20, respectively, a ratio of 3 to 2. At P, the percentages of B and C are 60 and 40, respectively, a ratio of 3 to 2. This is the ratio of B to C at every point on the line AP.

Subdivision of the triangular diagram by lines spaced at equal intervals, such as the 10 percent intervals in Fig. 1, is not actually necessary. The lines parallel to the sides are usually omitted in phase diagrams. It is important, then, to know how to locate the point representing any given composition or, conversely, to determine from the location of any given point the composition it represents. In the case of a binary system, the distances from any given point to the ends of the line represent *relative* proportions of the components, and are converted to fractional weights by dividing each distance by the length of the line. It must be borne in mind that the distances are taken in reverse order. For instance, the relative proportions of A and B in N are the distance of N from B and A, respectively. In showing only a portion of a phase diagram it is sometimes convenient to designate 10 percent intervals, or other suitable intervals, along the sides of the diagram, as shown along part of the base AC in Fig. 1. These points are represented by short segments of the longer lines in the figure.

Fig. 2 illustrates a method of estimating the composition at any given point within a triangular diagram, in this case point M, which is in the same location at in Fig. 1. Straight lines are drawn from M to one of the sides and parallel to the other two sides. Any side may be selected, but it is usually convenient to select the longest side, in this case the side AC. The lines MV and MW are parallel to the sides AB and BC, respectively. The intersections of these lines with AC divide the latter into three segments, and the lengths of these segments are relative proportions of A, B, and C in M. The intermediate segment VW is the relative proportion of B, the component at the opposite vertex. The segment for A is the one farthest from A, and the one for C is the one farthest from C. The procedure is reversed for locating any given composition in the diagram. Upon dividing the length of each segment by the length of the side AC, it is found that the composition of mixture M is 50 percent A, 30 percent B, 20 percent C.

The System CaO-Al_2O_3-SiO_2

The phase diagram of the system CaO-Al_2O_3-SiO_2 is presented in Fig. 3. This diagram is essentially the same as the original phase diagram of Rankin and Wright,[3] but with such modifications as were found necessary as a result of later investigations.[a, 3, 5, 6] These modifications do not affect the portion of the system under study here, and will therefore not be discussed.

The phase diagram is a graphic representation of the data obtained in the investigation of the system. It not only reduces a large volume of data to a convenient form, but it also provides a base on which to operate in the interpretation of the data; that is, in applying the properties of the triangular diagram in the interpretation of the phase diagram, we are actually interpreting the data from which the phase diagram is obtained.

Each point in the phase diagram represents a state of equilibrium, or a state of rest. Since a process represents changes of some kind, not a state of rest, the phase diagram does not represent processes. It is useful, however, in studying processes, with the aid of additional information or assumptions. For example, the normal course of crystallization of a liquid in the system may be traced by assuming that at each temperature a state of equilibrium is attained before cooling to a slightly lower temperature. Each successive equilibrium state may be found from the phase diagram. The course of crystallization in an actual process may differ considerably from this if the assumption of continuous attainment of equilibrium does not apply to the process.

When a pure crystalline compound is heated, it may decompose, or it may arrive at a definite temperature, or melting point, without decomposition. In the latter case it melts, without change of temperature, until it is completely transformed into a liquid of the same composition. Upon cooling, the liquid solidifies at the same temperature; that is, at the melting temperature. In a mixture such as those encountered in the system CaO-Al_2O_3-SiO_2 the situation is quite different. The mixture starts to melt at some definite temperature, and some crystalline phases are present as that temperature is maintained. The quantity of liquid increases as the temperature rises. Eventually a temperature is reached at which all of the crystalline substances are absent. This is sometimes termed the melting point. However, it is not a melting point in the same sense as in the case of the pure crystalline compound which melts without decomposition. The solid phase present at a temperature slightly below the complete fusion is not of the same composition as the liquid, but can exist in equilibrium with the liquid until the temperature is raised to complete the process of fusion. Because

(Continued on page 106)

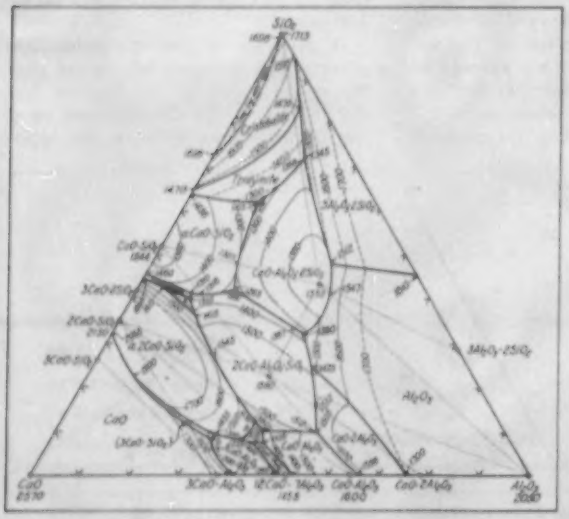
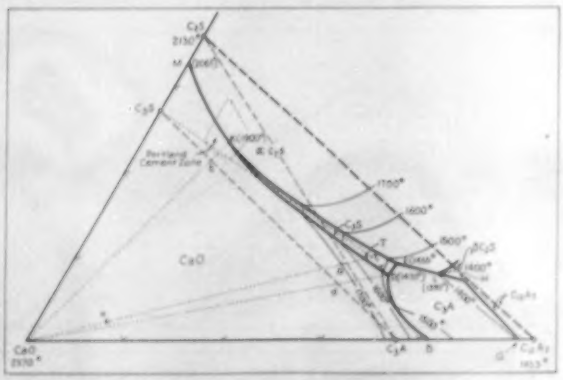


Fig. 3: Phase diagram of the system CaO-Al_2O_3-SiO_2. (Rankin and Wright as modified by later investigators)

Fig. 4: The system CaO-C_3S-$C_{12}A_7$, shown below



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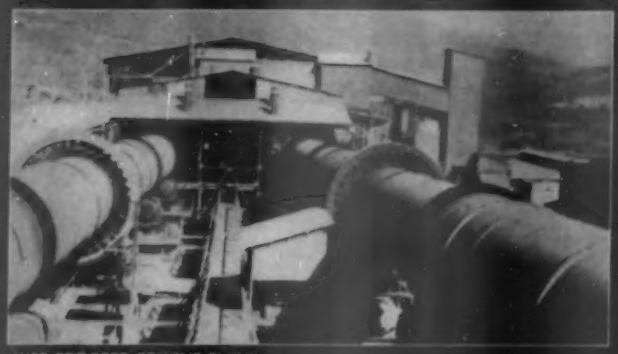

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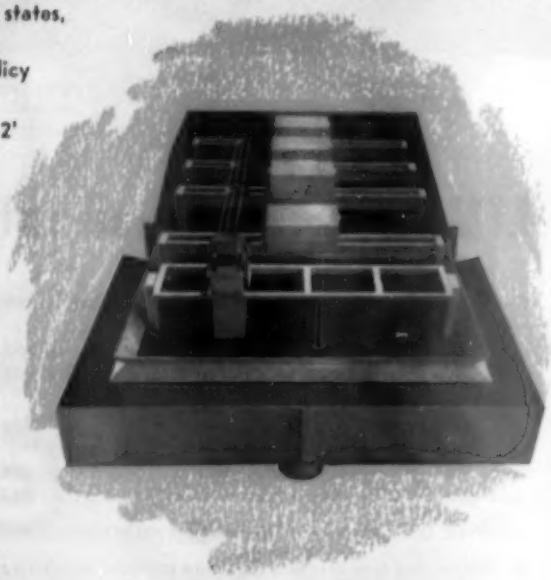

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ROTARY KILN Its Performance and Development

Part 3: Kiln temperature gradients and differentials, stone sizing, flow and calcining rate

By VICTOR J. AZBE*

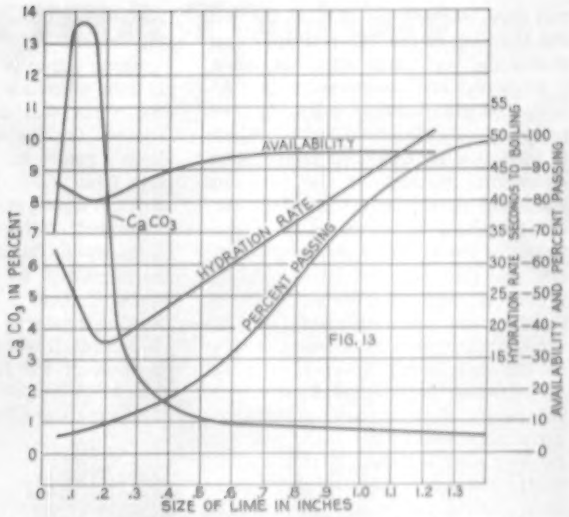

Fig. 13: Test of rotary kiln lime fractions. Poorly sorted stone shows variability in lime quality by size

IMPERFECT ROTARY KILN PERFORMANCE is to a great extent due to high temperature differentials necessary to attain the desired heat flow. If favorable heat transfer conditions were not so difficult to achieve, temperatures throughout would be less.

There are many types of differentials — those between the gas stream and surface of the stone, to which the differential through the stone bed should be added, and also the differential through the individual piece of stone which, for the calcining zone, is illustrated by Fig. 6 (see ROCK PRODUCTS, February, 1955, p. 109).

Fig. 12 presents temperature gradients encountered down the length of an ordinary rotary kiln. There are four curves entitled "gas stream temperature, bed surface temperature, bed mean internal temperature, and bed lowest temperature. The differences between the curves are the temperature differentials.

At "A" the preheating zone terminal differential is shown as 1500 deg. F. This is conducive to fast heating of stone, but 1500 deg. F. represents a rather high stack loss because there is a surplus of heat entering the preheating zone. This is evidenced by the gases cooling slower than the stone preheats. One may say that there is insufficient stone to cool the gases, the result of a poor lime-fuel ratio.

As will be noted immediately at the entrance of stone, instead of two temperature lines there are four. There could be more, as there is an upper and lower gas stream, but only the differentials are shown between the average of the gas stream temperature and the stone bed temperatures.

The stone segregates into the heavier pieces, riding in a full sweep the outside of the rotating mass and the lighter moving through a limited oval in the center of the bed. The larger stone, although requiring more heat, will heat up much faster than the inner pieces to which heat has to penetrate by conduction, due to their freer exposure to the very hot gases.

This explains the three bed temperature curves. Until the center of the inner and smallest stone is preheated, the stone may not be called preheated and this does not occur until deep in the calcining zone. It can no more be called preheated than the lime in the hot zone may be called calcined, until the core of the inner part of the mass is calcined, and both this act of preheating as well as of calcining are difficult to accomplish in an open type rotary kiln.

We have ample evidence of this at the hot end of the kiln. Gas temperature is 2900 deg. F. and surface of lime temperature is 2600 deg. F., nevertheless, core is inclined to persist in the small pebbles that would calcine in a flash if exposed to the full kiln temperature. Inner bed temperature is hardly more than 1650 deg. F. Between the flame temperature and the residual carbonate there is a temperature differential of 1350 deg. F. Most of this temperature differential is in the bed, the causes being segregation of sizes and the low heat conductivity of soft burned lime. The high CO_2 concentration of residuals is a factor too, but as a whole the reason is that the surface components do not transmit heat readily to the inner regions, a matter which can only be corrected by forcing the surfacing of these inner components.

It is the failure of surfacing that causes excessive temperatures, slagging and ring troubles, overburned lime

*Pres. Azbe Corporation, St. Louis, Mo.

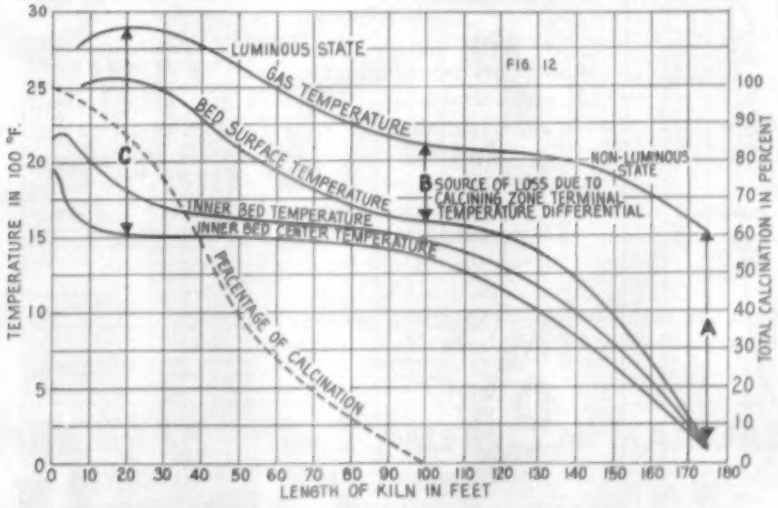

Fig. 12: Curves showing temperature gradients of an unimproved rotary kiln

and core, impairment of capacity, and the lowering of thermal efficiency that makes the very large kilns necessary.

High exhaust temperature at "A" is due to the excessive calcining zone temperature differential at "B" which is high due to excessive temperature differential throughout the calcining zone and particularly toward its discharge point "C." Putting in a preheater at the kiln end and lengthening out the kiln are not correcting the failure to surface. This can only be satisfactorily accomplished through segmentation of a substantial portion of the kiln length, more from point "B" toward the hot end than toward the cold end. If we take care of the calcining zone in this respect, the preheating zone will largely take care of itself, because of the increased stone flow and the differential at point "A" which will still be 600 to 700 deg. F. even when the kiln is operating at its highest efficiency.

Stone Sizing

There is really only one solution. Increasing the length of the kiln would do it, if it was not for the cost and upkeep of the increased length and consequent radiation heat loss. Additional length bears a rapidly diminishing return.

Stone sizing is an important factor in kiln efficiency. Over 30 years ago the writer was engaged to study the reasons for the very poor quality of lime a rotary kiln produced in a certain Ohio plant. In a 1926 article in ROCK PRODUCTS this experience was described: "The stone fed to rotary kilns should be as uniform in size as is permitted by practical considerations. If there is a lack of uniformity and especially if very small material is present, it will be found that a large portion of the fines will not be calcined." A test of lime from the above kiln gave the following results:

Screen and Chemical Analysis

	Percent	Percent
On No. 3 mesh	29.2	1.34 $CaCO_3$
Through 3 and on 6 mesh	43.0	8.50
Through 6 mesh	27.8	33.44
Average	100.0	19.33 $CaCO_3$

It is an extreme case but interesting in that it shows how bad conditions can be when sizing is poor. That material was small, and a large collective surface was of no help, because being small may have made the bed conductivity only worse.

Another case which was well studied is shown in Fig. 13. High calcium stone passing the 1½-in. screen was poorly sorted for rotary kiln purposes as 50 percent passed the ¾-in. screen resulting in poor lime quality. The lime obtained was screened into seven separate sizes, each tested separately. The $CaCO_3$ content and the hydration rate curves are particularly interesting. It seems that of the seven sizes, each assumed its own special position in the bed and seven different kinds of lime were made.

Fig. 14 classifies rotary kiln stone sorting from very poor to very good. The very poor in this case is the stone of the previously mentioned test case, that is 50 percent passing half size. Perfect sorting would be none passing half size. What practical sorting constitutes is a question that is hard to answer. There is a limit to the number of stone sizes that one can handle and separately calcine. There are ways to help matters, but the only correct method is through substantial segmentation in which the stone classified as very poorly sorted could be considered as well sorted.

As narrow sorting of stone is very important, when there are two or more kilns the size should be split, with one portion going to one, the other going to the second kiln. In some plants the CaO availability could be improved by several percent in this way, and kiln capacity increased simultaneously since lime discharge from kiln would not be retarded to finish off the residual core.

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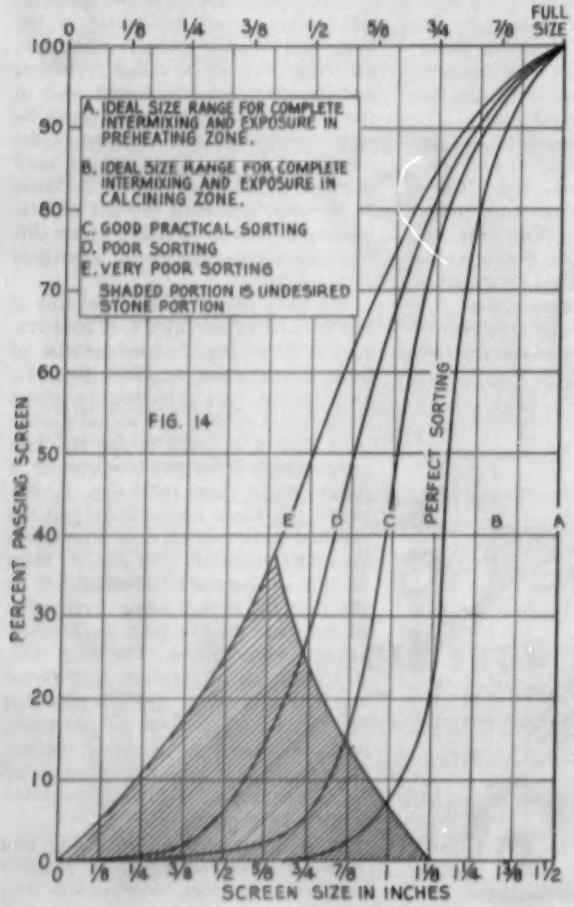
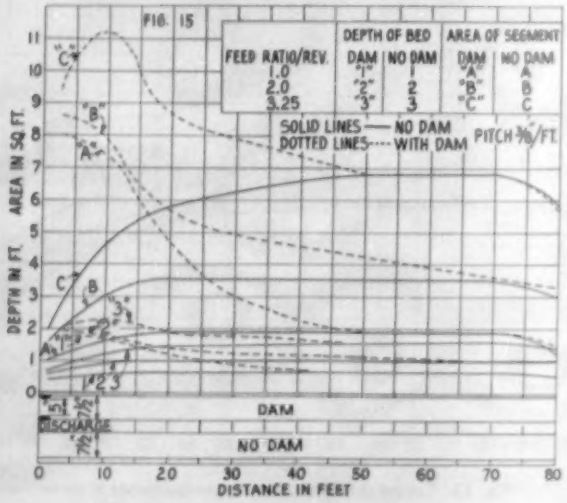

FULL SIZE
A. IDEAL SIZE RANGE FOR COMPLETE INTERMIXING AND EXPOSURE IN PREHEATING ZONE.
B. IDEAL SIZE RANGE FOR COMPLETE INTERMIXING AND EXPOSURE IN CALCINING ZONE.
C. GOOD PRACTICAL SORTING
D. POOR SORTING
E. VERY POOR SORTING
SHADED PORTION IS UNDESIRED STONE PORTION
FIG. 14
PERFECT SORTING
PERCENT PASSING SCREEN
SCREEN SIZE IN INCHES

Fig. 14: Classification of rotary kiln stone sorting from very poor to very good

Fig. 15: Effect of dam on material flow disposition determined by scale model. Solid lines indicate no dam; dotted lines, with dam. The pitch is ⅜ in. per foot



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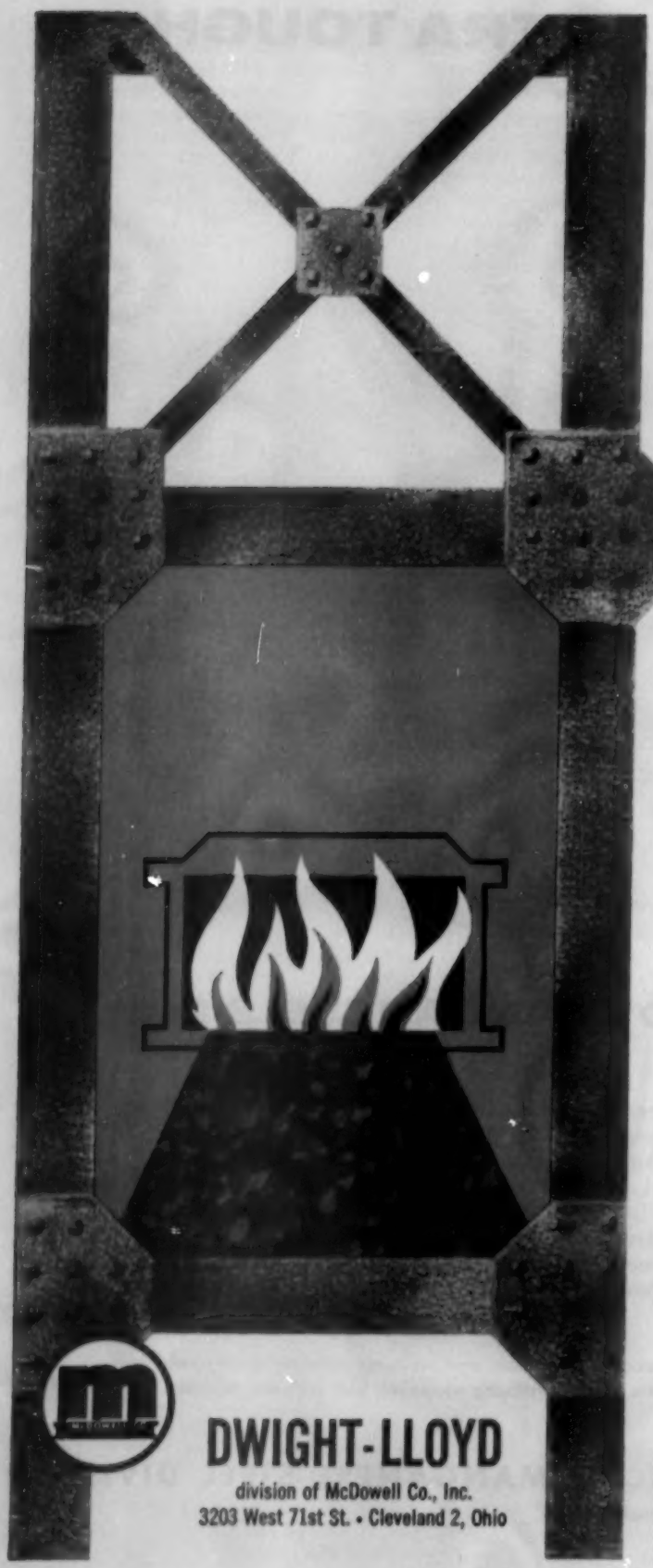

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Stone Flow

Lifters are not a solution and do not last long. There are dams which help in some cases and not at all in others. Whether they do or not depends on initial sorting and on rotation. If sorting is poor, a thin bed for a ready penetration of heat is almost necessary but the passage will be rapid and heat waste greater. With a dam, time of kiln retention will be greater and heat penetration more difficult which could be helped by higher rotation to induce a certain degree of mixing. High rotation, however, is only possible with kilns of low inclination, substantially dammed.

An inquisitive lime producer was curious to know the effect a dam would have on material disposition. He built a scale model of the kiln and ran an elaborate series of tests. Some of the results are presented by Fig. 15. We do not believe that the same results would have been obtained in the case of an actual kiln as a scale model does not reproduce the effect of gravity to scale. Thus, in a large diameter kiln, segregation will be more than in a small diameter model.

Thus, the solid line curves representing the model with no outlet dams, shows how the load drops off toward the outlet, how the area of the load segment reduces and to what extent the opposite is true in case of dotted lines representing the model with the dam. Both also show the effect of stone feed ratio per revolution.

The actual measurement of the kiln load after a sudden shut down in the case of undammed 8-ft. diameter kilns revealed that throughout the calcining zone, the depth diminished. The chord narrowed from 75 in. to but 40 in., indicating a flow increase where retardation would seem most desirable. In the case of a dammed outlet, the load at discharge would be heavy, but if the kiln had been rotated at a high speed in the back of the kiln it would be light. It is suggested when dams are used that there be more than one.

Fig. 16 shows relation of depth of lime in kiln, width of lime layer, kiln load and projected heat absorbing area. We have found kilns of 8-ft. internal diameter which had a bed of only 8 in. and others that operated at 22 in., one having a load of but 10 tons, the other 50 tons of lime.

Fig. 17 presents several sketches. The open kiln, shown at "A," is undesirable due to segregation and light load of low retention. It can be improved by a discharge dam at "B-1," but for high rotation it should have a second dam such as "B-2."

The dam does more than just build up the load. We believe, as shown by sketch "C," that it discharges the more exposed lime at a faster rate than the inner, slower calcining mass. By this means, if true, the fines would tend to be precalcined at dam "2" in sketch "B" or, if discharged, be after-calcined in a finishing zone "4," shown in sketch "D."

However, the real solution to it all is a quadrated kiln shown with its load in section "E."

Calcination Rate

A cubical piece of limestone of ½-in. size calcines four times as fast as a one inch cube. This is because for a given volume, it would offer four times the calcining surface and only half the calcining resistance (radius). This would apply whatever heat had a free access as in a furnace where radiations assert themselves directly or in a vertical kiln where the hot gas percolates through the bed of calcining stone. It does not apply to rotary kilns since in this case calcination can only take place at the rate at which the peripheral surface of the bed can obtain and transmit the heat which is quite limited.

As a result, while there is an advantage in stone size reduction in the case of vertical kilns, there is no such advantage in the case of rotary kilns, and the capacity of a kiln calcining 2-in. stone is likely to be the same as one inch stone, because in either case

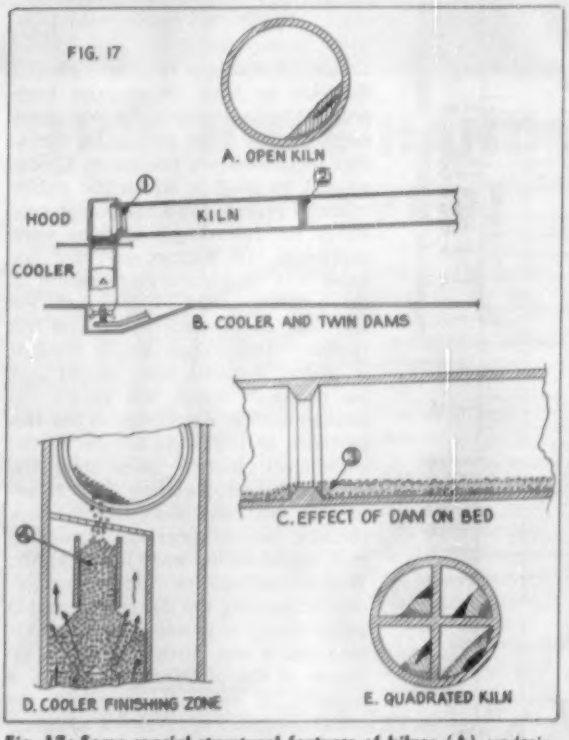

Fig. 17: Some special structural features of kilns: (A) undesirable open kiln which results in segregation and light load of low retention; (B) cooler and twin dams; (C) effect of dam on bed; (D) cooler in finishing zone; (E) quadrated kiln cross section

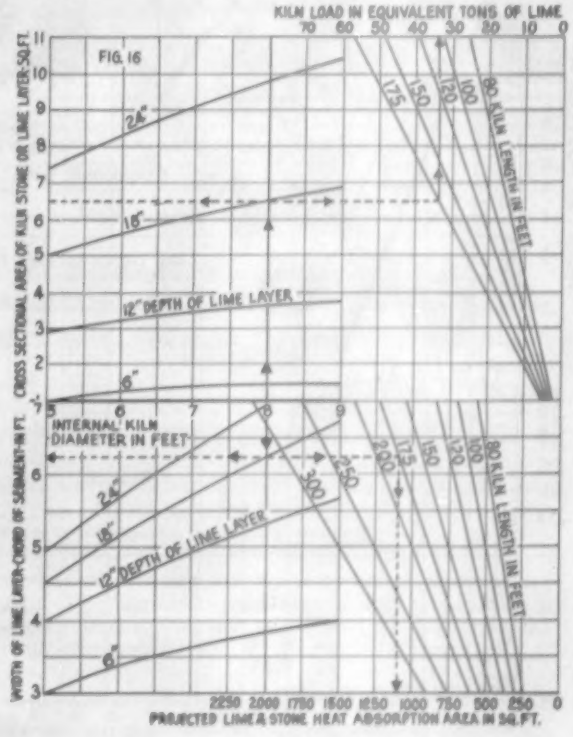
KILN LOAD IN EQUIVALENT TONS OF LIME
FIG. 16
WIDTH OF LIME LAYER-CHORD OF SEGMENT-IN FT. CROSS SECTIONAL AREA OF KILN STONE OR LIME LAYER-SQ.FT.
24"
18"
12" DEPTH OF LIME LAYER
6"
80 KILN LENGTH IN FEET
INTERNAL KILN DIAMETER IN FEET
PROJECTED LIME & STONE HEAT ABSORPTION AREA IN SQ.FT.

Fig. 16: Showing relation of depth of lime in kiln, width of lime layer, kiln load and projected heat absorbing area

the peripheral surface will be the same.

There is a further matter to consider. A stone slabby in shape, such as 1- x 3- x 4-in. of 12-cu. in. in size, will have the same calcining time, when heat has free access, as a 1½-in. cube of stone possessing only 3.7 cu. in. of volume, due to the increased surface ratio which helps calcination and a lesser thickness which tends to resist it.

It would seem that selection; that is, the screening of stone, should be related to its calcining rate rather than by an arbitrary division of size. In the case of vertical kilns such screening, governed more by thickness than width, is definitely advantageous, but special slotted rather than square opening screens are required; a trapezoidal screen opening.

In the case of present type open rotary kilns such selection by shape may be of advantage in the case of the largest of the stone only. When, however, the kilns become segmented and all size components become repeatedly and freely exposed to heat, then we believe there will be an advantage in limiting size to increase the surface and division by shape of all the stone.

As shown by the stone chart Fig. 18, the calcining time range may be four. The smallest of each group calcining in one-fourth the time of the largest and all of the largest calcining in equal time. The various size groups of stone A - B - C fall in between the heavy lines.

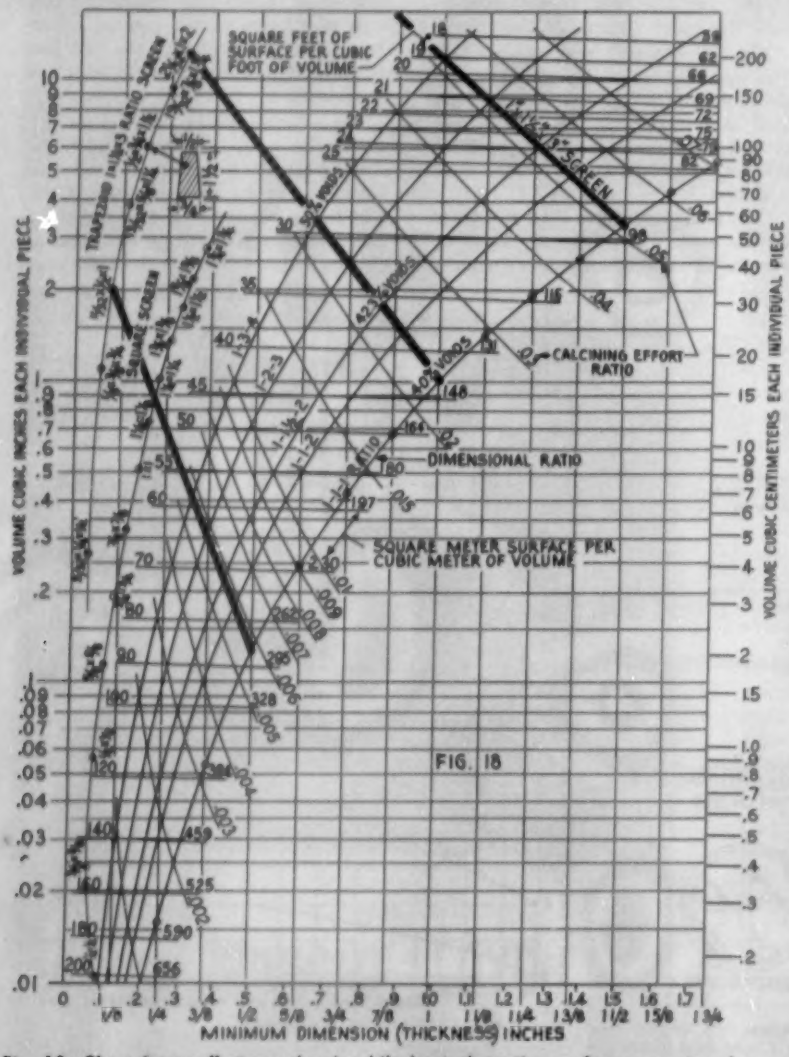
SQUARE FEET OF SURFACE PER CUBIC FOOT OF VOLUME
CALCINING EFFORT RATIO
DIMENSIONAL RATIO
SQUARE METER SURFACE PER CUBIC METER OF VOLUME
VOLUME CUBIC INCHES EACH INDIVIDUAL PIECE
VOLUME CUBIC CENTIMETERS EACH INDIVIDUAL PIECE
MINIMUM DIMENSION (THICKNESS) INCHES
FIG. 18

Fig. 18: Chart for small stone, showing kiln heat absorption surface per unit volume and relative calcination rate for stone of varied size and varied dimensional ratios

Pennsylvania Stone Producers Annual Convention

TWO IMPORTANT MEETINGS were held in Harrisburg, Penn., on February 3 and 4; the annual meeting of the Pennsylvania Stone Producers Association and the annual meeting of the Pennsylvania Highway Material Producers' Conference on the second day.

At the stone producers' directors meeting, President R. B. Garman called for the report of the association's general manager, H. H. Wagner, who reported on the competitive situation with relation to stone, gravel and slag purchased by the Pennsylvania Department of Highways and also on legislative matters. Mr. Wagner revealed that during 1954 the Department of Highways purchased 2,367,567 tons of crushed stone, 311,758 tons of gravel, and 606,277 tons of slag. Compared with 1953, the Department purchases of stone increased slightly while they dropped over 4 percent for gravel. Slag purchases increased 4 percent. Prices of all highway aggregate materials were less in 1954 than they were in 1953. Bituminous concrete materials purchased during 1954 were 1,341,229 tons of stone, 221,698 tons of slag, and 165,613 tons of gravel.

General manager Wagner discussed the plan to have all quarries keep proper blasting records. He told about meetings with Jules Jenkins of Vibration Measurements Engineers, Chicago and his staff in which the public relations problem and equipment necessary for recording vibrations were explained. Mr. Wagner said that not more than 40 percent participation in the program could be expected. He also told about conferences with the Highway Department which resulted in having a clause incorporated into bid proposals which will permit the consignment of aggregates to the Department of Highways for use by the contractors, thereby eliminating the 3 percent Transportation Tax. Negotiations also are underway to have the one percent sales tax eliminated as it applies to the stone industry. Mr. Wagner outlined the trouble encountered in meeting the flat and elongated requirements as presently specified. He said that it was partly due to the increase in size of Pennsylvania No. 4 material. A committee met with the chief research engineer and members of the state highway testing laboratory. It was suggested to industry mem-

(Continued on page 100)

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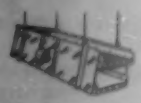

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Water Granulated Blast Furnace Slag and Its Effect on Soil Fertility

By G. H. DOSCHER*

WATER GRANULATED BLAST FURNACE SLAG is calcium silicate rather than calcium carbonate as represented by limestone and has a $CaCO_3$ equivalence of not less than 80 to 90 percent. Each ton, as produced by the blast furnace, contains all the calcium and magnesium from 1800 to 1900 lb. of limestone. In passing through the furnaces this limestone is burned to quicklime, losing its carbon dioxide gas, and taking up instead various other materials including silica, sulphur, manganese, boron, copper, iron, zinc, and traces of other non-metallic minerals contained in the ore and in the coke that is used as the combustion agent.

In view of the mineral content and physical structure of water granulated blast furnace slag and the possibility of using lime twice, first in producing iron in the steel industry and then in agriculture as a liming material with added values, we believe that we are not merchandising a manufactured chemical compound, but are proposing to agronomy the further study of a by-product necessary in the production of steel that can be used profitably by agriculture.

Most of the experiments in the United States employ air-cooled slag fines in comparison with agricultural limestone. This air-cooled slag is a dense, crystalline product that is crushed and used for railroad ballast and for construction work and the fines or screenings resulting from the crushing are comparable to those obtained when limestone is crushed for similar uses.

Water granulated blast furnace slag, when the method of granulation includes the flume raceway between the point of water impact and the granulating pit, is a porous material mixed with minute glassy particles, essentially a frozen foam. This product is made up of cellular granules that are 95 percent through a No. 8 mesh sieve and from 14 to 20 percent through a 100 mesh sieve, approximately meal grading. This gradation is obtained without crushing or screening. In addition to increased solubility, the lighter weight particles (1 cu. yd. weighs approximately 1750 lb. wet) provide greater bulk in the soil per ton spread and greater surface area distribution than air-cooled slag or limestone fines.

A study of recent work by Ohio Agricultural Experiment Station, sponsored by the National Slag Association and reported in Research Bulletin No. 708, November 1952, (1), clearly indicated superior values for water granulated blast furnace slag over both air-cooled slag fines and limestone. This work, together with the many papers crediting values for water granulated calcium silicate slags written by Dr. Walter H. MacIntire of Tennessee Agricultural Experimental Station, definitely suggests and invites further investigation of water granulated blast furnace slag.

European reports, including experiments in England back as far as 1900, give credit to blast furnace slag as a fertilizer, particularly mentioned the value of soluble silica as produced by the hydrolysis of the calcium silicate, and indicating improvement of the physical properties of a soil, resistance to disease, and healthy growth of grasses, grains and many vegetables.

Applications or incorporations of this product as called for by soil testing are primary to high soil fertility, but we believe that calcium is also a primary fertilizer. Would it not be the best practice to use a material that provides calcium freely and contains additional secondary benefits when preparing for high soil fertility?

The late Dr. James G. Vail, eminent chemist, mentions soluble silica and its effect on soil reactions. He states, "The reactions of soluble silicate with the complex minerals of the soil are only beginning to receive the attention they appear to deserve. Their function in accelerating growth seems to be indirect. By reaction, elements previously impounded are made available or the ability of the soil to hold moisture and air where they will be readily available to plant life, is increased. What little is known is restricted to few soils, and generalizations have yet to become available.

"Soluble silicates tend to reduce the fixation of phosphate by iron and aluminum, and to improve the water retaining properties of soils with some evidence of better utilization of the water and phosphate."

Minor elements included in water granulated blast furnace slag and their promise of value are brought out in a report of recent work on trace elements in agricultural slags by the U.S. Department of Agriculture at Beltsville, Maryland.

We are not thinking in terms of replacing limestone in every case, but we do feel that the important values indicated by work thus far accomplished should be put to use wherever justifiable and that further research should begin as soon as possible. It is our feeling that comparisons with limestone will only be repeated experiments. We would like to see consideration given to starting where others have ended.

As a starting point in examining values beyond its liming value we suggest the following:

(a) Availability of calcium and magnesium to plants by all known sources of these materials, especially those having economic importance to the farmer. Optimum ratio of calci-

(Continued on page 122)

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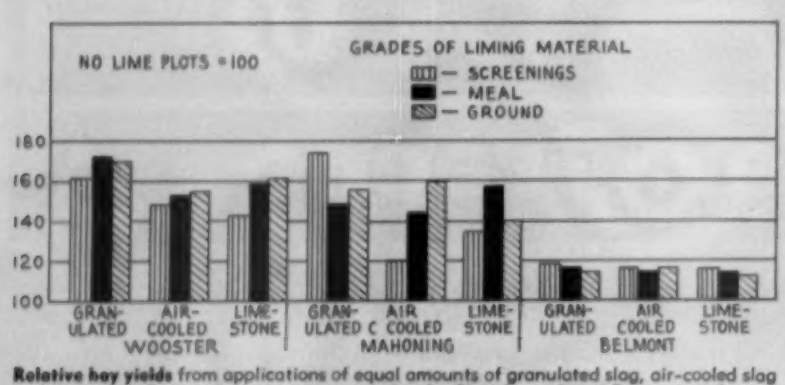
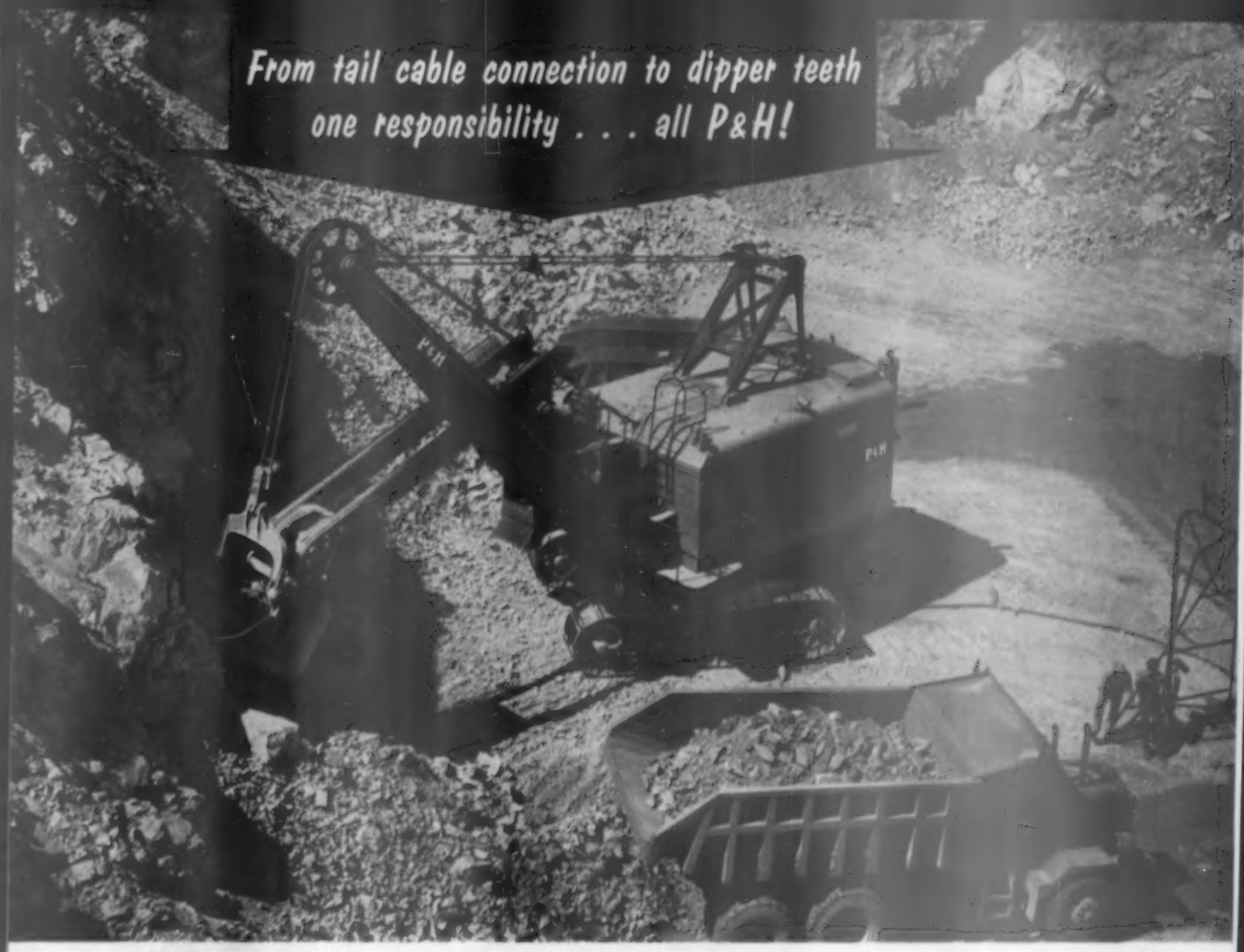


Relative hay yields from applications of equal amounts of granulated slag, air-cooled slag and limestone. Data is from an experiment by the Ohio Agricultural Experiment Station



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Increased Limestone Tonnage Based Upon Proper Use

By O. T. COLEMAN*

AS LARGER NUMBERS OF FARMERS realize the value of properly applied limestone they will, no doubt, use more of this important soil treatment. When used to make up for the deficiency of calcium, and often magnesiums, it will not only materially increase the acre yield of crops, but will add to their protein and mineral content, and possibly the vitamin content, all of which are so vital for satisfactory growth and health.

Formerly we based the value of limestone upon its ability to reduce soil acidity. Because of its effect on the availability of certain plant foods and the form of magnesium that might be used to best advantage, soil acidity is still important. But to have a balanced soil from 65 to 75 per cent of the soil particles should be covered with calcium, so getting enough limestone in the soil to furnish this large supply of this important plant food is extremely important. It has been estimated that to correct present calcium deficiencies in Missouri soils alone, it would take approximately 40 million tons of limestone. Then to replace that removed by cropping, leaching and erosion it would require about 5 million tons annually—or approximately the 2½ times the nearly 2 million tons used in Missouri in 1954.

Increasing Use Due to Education

Although there has been a rather significant decrease in limestone used in the nation in recent years, the reports of County Extension Agents indicate an increase in use in Missouri of nearly 20,000 tons in 1954 over 1953. This increase may be partly due to the cooperation given by the ASC program, but the major part is undoubtedly due to our farmers increased knowledge of its importance and its proper use, based chiefly upon our expanded soil testing program which has made soil tests available to every farmer in the state. Either he can have these tests made in his own county laboratory or, if he doesn't happen to live in one of the 97 counties that have laboratories, a choice can be made from at least two adjoining county laboratories. In other words, every county in the state either has a county laboratory of its own, or joins at least two counties that do have laboratories. To have soil tests made, the samples are taken to the county agent in the county where the land is located, and he sends them to one of the adjoining counties with whom arrangements have previously been made for testing. The results of the tests are then returned to this county agent, who is in the best position to obtain the added information needed from the farmer so the kind of soil and past history of the field can be taken into consideration and the farmer can be given credit for recent limestone applications and other soil treatments made that have not yet definitely affected the soil, in making soil treatment suggestions. One must remember the soil tests are tests of the soil itself and what is applied to the soil does not usually affect the soil test until it has affected or become a part of the soil. They do not tell you *what should be applied* to the soil — but what is in the soil in certain forms —and the county agent uses the training he has received from the correlation of these tests with years of experimental work, in interpreting these soil tests, and in using the information available regarding the past history and future plans for the field to determine the soil treatments that will give best and most economic returns.

How to Get Accurate Soil Tests

The accuracy of these soil tests depend largely upon how well the samples are taken to represent the surface 7 in. of each different kind of soil in a field, or area. In order for these samples to represent this field or area, each of them should be made up of at least five well distributed individual samples thoroughly mixed together. These individual samples may be taken with an auger, soil sampling tube, a brace and bit, or a spade. When taken with an auger, a sampling tube or brace and bit, the whole amount taken can usually be placed in a bag to make up the representative sample for testing; but if the samples are taken with a spade, a strip about an inch wide should be removed from the center of each slice as a part of the composite sample. In case the total of the individual samples collected—from a field area that is all alike—amounts to much more than a tea cup full, all of it should be thoroughly mixed together in a clean bucket, on a piece of clean oil cloth or a piece of paper and only about a tea cup full removed for the test.

After the results of the tests and suggestions from the county agent are obtained as to how much limestone to apply, it can be put on the land any time machinery can be driven over the fields. For best results, place the agricultural limestone well into the soil so a large part of it will be in the zone of the plants feeder roots. To do this, spread it on the surface and plow under, or work it well into the soil when the seedbed is prepared. Adequate amounts of limestone worked through greater depths of soil will encourage deeper rooting of legumes, but if worked through more than a 7-in. depth, proportionately larger amounts should be used. When spread on pastures or meadows, it would usually be best to plow it under, but satisfactory results may be had if the limestone is cut deeply into the surface with a sharp disc, field cultivator, or spring toothed harrow.

Although agricultural limestone is extremely important, one must remember it cannot take the place of other plant nutrients. When limestone increases crop yields, the need for other plant foods increase. Nitrogen, phosphate or potassium, or a combination of one or more of these plant foods, may be needed in varying amounts, in addition to the agricultural limestone for most satisfactory returns. For best returns, it should be properly used in conjunction with other needed soil treatments as indicated by soil tests on properly taken soil samples.

How often limestone should be applied will depend on the amount put on, its fineness and quality, the cropping systems used, size and kind of crops harvested, amount of erosion, and the texture of soil. If limestone is used according to soil tests, it will usually supply the needs of the soil for 6 to 10 years. But, before making another application at the end of this period, it would be well to properly sample the soil again and have another soil test made.

Also it is possible there may be a greater need for magnesium limestone than was the case with the first application. The test for acidity may be helpful in determining the kind of magnesium that should be applied. Where possible, magnesium limestone should be used to supply the magnesium, but if the pH of the soil is around 7 or above, additional magnesium limestone would cause an even higher pH, so in this case some other form would be advisable. The more often legumes are grown, the higher

(Continued on page 112)

*Extension Specialist in Soils, College of Agriculture, University of Missouri.

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More Agstone Advertising and Sales Promotion Needed

By FORD S. PRINCE*

THERE ARE SEVERAL REASONS for the decline in agricultural limestone use in the United States. Generally, lower farm prices is one. Lack of labor and equipment for spreading or lack of spreader service is another. Inability of farmers to get liming material when they want it must be considered in some instances. The requirement that the use of agricultural limestone must be supported by a soil test may have caused some of the decline. No analysis of this subject would be complete unless it considered whether the educational job which is being done by the industry, by Extension workers and other forces is adequate.

Vegetable growers (excluding potato growers), grain farmers and livestock producers are the farm groups, particularly in the northeastern part of the country, who use the most liming material. Among these groups, it is the dairymen in the Northeast who use the bulk of the agricultural limestone. It is a well known fact that this segment of the agricultural industry has been hard hit with lowered milk prices and with continued high costs of the concentrated feeds they must buy, grains on which fixed support prices still exist. The lowered income which this group is now experiencing does not allow for the purchase of everything they would like, including liming materials.

Moreover, these livestock men doubtless have been pretty well around over their land with agricultural limestone at some time during the recent past and believe that they may relax their applications for a rotation or so without endangering their crop yields. There are very good reasons why this is fallacious thinking, reasons which should be encountered with a more vigorous educational program.

Lack of labor and equipment for spreading is another factor of some importance. Agricultural limestone is a bulky substance and handling and applying it is a considerable chore. In many instances the direct application has been done by commercial spreader services, some of whom have gone out of business. Oftentimes getting the liming material on the land when it should be spread is not possible because for some reason it has not arrived at the proper time. Perhaps the farmer has his seeding done, and his new seedings are where he usually puts agricultural limestone. Or if a spreader service is used, the spreader comes at a time when the fields are wet and going over them with a heavy truck will cut them up and injure them severely. Many farmers know that it is more efficient to apply the agricultural limestone on plowed land in which case it can be worked into the soil rather than top-dressed on sod land where these commercial spreader truck services prefer to work.

The remedy for this situation, it seems to me, is to stockpile agricultural limestone at a strategic location or locations in the better agricultural counties where it will be available at all times. Then, if a farmer wants liming material at any particular time, say May 1, to apply to corn land or to land on which he is seeding down, he will be able to get it without delay. Too many times in the past farmers have had to depend upon rail shipments that did not arrive on time and when they did come, the liming material necessarily had to be applied as a top-dressing. This is not using it in the most efficient manner.

The use of soil tests to support the need for agricultural limestone is not mandatory in all states at present. Whether it should be is a matter that is now being debated by some of the State ASC Committees even in states which require the test. In theory this idea is alright. The soil test for acidity which is now being made is accurate enough, provided the soil sample has been properly taken to represent the area in question. This, we know, is not always the case. Besides, in the northern tier of states the ground is frozen usually during the three or four winter months and it is difficult to take a soil sample, and especially to get one which is representative of the field which is to be limed. Failure to take soil samples in the autumn may mean the farmer will have to wait until spring to get them. By that time, it may be too late to order and receive agricultural limestone for spring application.

Although ours is a State which now requires a soil test, I hold no brief for it as a requirement for a farmer to secure lime. I do believe that if a test is required, it should be uniform in all the states. If it is required, either a vigorous campaign should be waged to get farmers to take their soil samples, or money should be set aside so that someone who is competent could be employed to do this job. If the latter method were pursued, better samples which would be representative of the fields would be obtained.

One of the forward looking agricultural limestone companies has recently allocated a representative to our State, whose business it is to advertise and sell the material. This is a step in the right direction, and should be emulated by other producers. It is impossible at the moment to think of a single commodity which has received so much free advertising as ground limestone. As a former county agent and as a state extension specialist, I am sure I have sold a lot of it. If the limestone companies put as much effort into advertising and promotional work as the Extension Service has in the past, there is no doubt but that more agricultural limestone would be sold.

There isn't any commodity which sells itself. Agricultural limestone is no exception to this rule. It may make it cost a few cents more per ton if it is advertised. But since agricultural limestone is the basis of soil fertility, it will repay its cost many times over through the years to those who use it regularly on their fields.

*Department of Agronomy, College of Agriculture, University of New Hampshire.

Is Agricultural Limestone Losing Out On The Farm?

By FIRMAN E. BEAR*

CONSUMPTION OF LIMING MATERIALS in the United States rose from less than 2 million tons in 1933 to over 30 million tons in 1947. Then it began to drop off — slowly at first and then more rapidly — to 21 million tons in 1953. Meanwhile fertilizer consumption increased, reaching an all-time high of over 22 million tons for the year ending June 30, 1954. This was an increase of 2 percent over the year before. In contrast, consumption of liming materials dropped 20 percent.

One ordinarily thinks of liming materials in terms of tons an acre and of fertilizers in terms of a few hundred pounds. But many farmers are now using a half-ton of fertilizer an acre and some of them over a ton. Does this mean that fertilizer is taking the place of lime? If so, it is a serious mistake. For there is no substitute for liming materials.

*Editor, Soils Science, Rutgers University.

(Continued on page 92)

Acid soils are a result of the solvent action of heavy rain over the centuries. The water that runs off the land and leaches through it carries large amounts of lime away and dumps it into the ocean. Once there, it is consolidated limestone deposits. Fortunately, here and there, some of these limestone deposits have been shoved up out of the sea to form dry land. This makes it possible for us to pulverize the limestone and return it to the soil from which it came.

Need High Calcium Saturation

In general, what we are trying to do is keep the soil's clay and organic matter complex saturated with calcium to the extent of about 65 percent of its exchange capacity. The remaining capacity should be taken up with about 20 percent hydrogen, 10 percent magnesium, and 5 percent potassium.

Calcium continues to be lost from the soil as a result of the solvent action of the rainfall. And, in proportion as more nitrogen and more potassium fertilizers are applied and more organic matter is composed in the soil, more calcium is carried away in the drainage waters. If the calcium level of the soil is allowed to drop below the suggested level, the plant uses less calcium and more potassium, a very uneconomical procedure. For potassium is a much more expensive element than calcium, and any excess use of it by crops is costly.

Need Limestone To Counteract Acid-Forming Fertilizers

Fertilizers are changing rapidly. The older types carried a good bit of calcium in the form of calcium phosphate and sulfate. Nitrate of soda and organics supplied much of the nitrogen. This is effected largely by discarding calcium. Also, we are using a lot more potassium, which tends to replace calcium in the soil's exchange complex with resulting loss in the drainage. And, finally, consumption of acid-forming nitrogen fertilizers is increasing very rapidly, with resulting need for much more liming material to counteract their acid effects.

One would think that use of liming materials would be rapidly increasing instead of going backward, particularly because of the assist from the Agricultural Conservation Program. It is interesting to note that this agency claims credit for about 15 of the 21 million tons of liming materials consumed during 1953.

Lack Organized Sales Effort

Maybe that's the reason for the falling-off in tonnage of liming materials. When producers become that dependent on a federal agency for the sale of their produce, what can they expect? Unless they take the business back into their own hands and conduct a continuous well-organized sales campaign of their own, they are destined to further loss of volume of sales.

The other day I drove downstate some 50 miles to talk at a Kiwanis-farmer luncheon. On the way down and back I saw a number of signs having to do with fertilizers and fertilizer dealers. These were so conspicuous that I remember the names of the companies that were represented. But I did not see a single sign that mentioned liming materials.

There are a great many competitors for every dollar any man has to spend. The farmer's dollar is no different from any other dollar, and it will buy only so much. In this highly competitive market it is much more likely to buy a weedicide, fungicide, insecticide, or more fertilizer than it is to buy a liming material. That is, unless the limestone producers do something about this. Liming material can be sold and it should be sold. The producers have an obligation to sell farmers the agricultural limestone they need and can use to advantage. The question is: Will they do it?

SOIL TESTING Can Increase Lime Use

By R. L. COOK*

AGRONOMISTS at Michigan State College have long recommended *soil testing* as the only safe way of determining the liming material needs of soil. Overliming is not common and probably seldom occurs on acid soils. Where it has occurred, or may occur, the remedy is simple. In most instances, a small amount of boron and/or manganese is the answer. In other words, there is nothing to worry about so far as injury to crops is concerned.

The writer has known of instances where limestone was applied on soil with pH of 7.8, where calcium carbonate occurred at the surface. In one such case the calcium carbonate content was 20 percent. The surface plow layer already contained 200 tons of free calcium carbonate on each acre. Clearly that farmer wasted his money, even if the lime was not injurious. A sound, lasting business cannot be built on such merchandising.

Lime and fertilizer company agronomists, as well as Land Grant College agronomists, know that farmers must obtain returns on their investments in soil treatment materials if they are to be able to make regular reinvestments. Surely, soil testing has been a wide step in the direction of making it possible to give farmers sound advice regarding purchase of soil amendments.

Many Limed Soils Need Reliming

How can a farmer know that his soil needs *more* lime if the soil is not tested? There is no way to be sure except to make some kind of a test. Several tests can be used. Perhaps the best procedure would be to analyze the soil for exchangeable bases. For routine work, this method is too slow and time consuming. Agronomists in the North Central Region are rather generally agreed that a pH determination is a good clue as to how much liming material may be needed on a specific soil type. Liming recommendations at Michigan State College are based primarily on pH and soil texture. It is true that organic matter content also influences lime requirement and is automatically considered as those who make recommendations come to vary them with soil type. The county agricultural agent, Soil Conservation Service field planner, or extension agronomist is best qualified to make such recommendations.

Soil Testing Will Increase Use

Is liming any less important than fertilizer useage? No, on the contrary, it is more important, and is usually suggested as the first agronomic practice where soils are acid! It seems logical then that recommendations should be based on soil tests conducted by an accepted method.

Michigan has 53 county soil testing laboratories besides the central laboratory at East Lansing. The number of samples tested annually has increased from 2300 in 1950 to 65,000 in 1954. Such an increase can only mean that farmers recognize their value and expect to gain from using the results.

A laboratory is located in each county or in an adjoining county. Thus, any farmer, ACP official, or

(Continued on page 96)

*Head, Soil Science Dept., Michigan State College.

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Powered by diesel engines of 125 to 600 h.p. "Eucs" have top speeds with full payload, up to 36 m.p.h. Five and ten speed transmission, or torque converter with semi-automatic transmission available. The favorable ratio of horsepower to payload means more pay tons hauled every trip.

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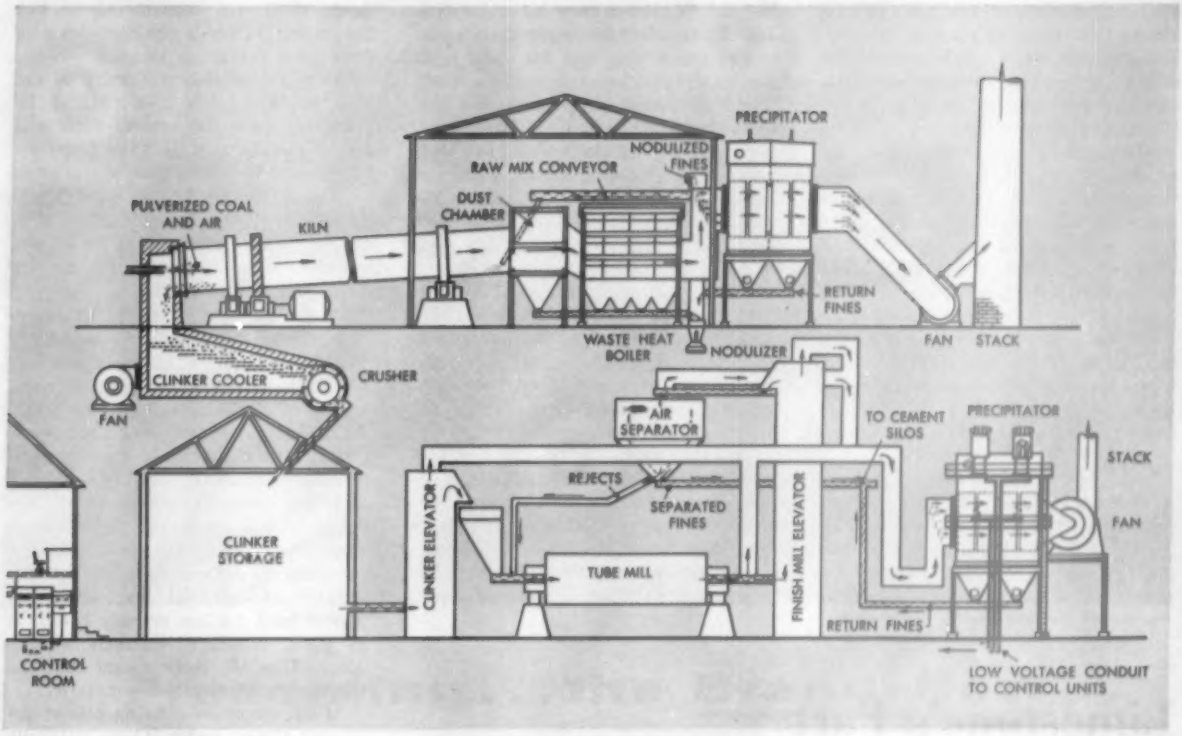

How dust collecting problems are handled in the modern cement plant

The "why" of the Cottrell precipitator is well known to cement plant personnel—its use in nuisance abatement and cement dust salvage is well established. These diagrams explain the "how" of the Cottrell, including its familiar application to kiln gas and, more recently, its use in the ventilating system of the finishing mill.

Kiln Gas

The upper half of the drawing shows a Cottrell for cleaning kiln gases. They are first passed through a dust chamber to the waste heat boiler and from there to the electrical precipitator, where the dust is removed. Salvaged dust is returned by conveyor to the process. The cleaned gas is discharged to the atmosphere through an induced draft fan and the stack. (Wet process kilns may also be fitted with Cottrells).

And In The Finish Mill

Dust from the grinding mills has always been a major problem. The lower half of the diagram shows the recent application of the Cottrell for cleaning finish mill ventilating system gases. Cement dust is collected from the ventilating system serving the separators, conveyors and elevators. As before, recovered dust is returned to the process.

Separating Small From Large Particles

When large particles of low alkali content must be separated from very small particles of high alkali content, an integrated mechanical-electrical precipitator will do the job effectively. The mechanical element handles large particles, and the electrical element collects the smaller particles that escape it.

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With Research-Cottrell's electronically controlled Magnetic Impulse Rappers, there is no need for rapping shutdown periods or dampers. Automatically controlled and operated, the MI Rappers continuously rap the electrodes throughout precipitator operation, thus avoiding dust re-entrainment in the gas stream and assuring optimum precipitator performance at all times.

Many Design Advances

The MI Rapper is one example of many improvements that have taken place in the design of precipitators and their associated electrical equipment. Forty years of experience have provided Research-Cottrell with a rich store of engineering skill—it is this skill that has evolved the modern Cottrell precipitator, embodying a design based on knowledge gained through more than 2000 precipitators in many different fields. Fourteen of these have been installed or are under construction for cement plants. All of these precipitators were custom-engineered to individual specifications.

For a more complete description of the Cottrell precipitator, write to Research-Cottrell for Bulletin GB.

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lime distributor can reach an official testing laboratory in an hour or two. The pH test on a single sample requires only a few moments. A little organization and planning can prevent soil testing bottle-necks.

Michigan farmers have a good start on their 1955 soil tests. Soil science specialists, county agricultural agents and ACP officials cooperate in a fall soil sampling campaign which was, it is believed, very successful. Many farmers already know how much lime is needed on their fields. Greater effort should be made to have soil samples taken in the fall so the laboratories may not be so rushed during the spring. Also, there is a possibility in some locations for winter spreading.

The Role of Industry

The agricultural limestone distributor is the key man in this picture. He should arm himself with a soil sampler and go out to sell his product. The farmer is already soil test conscious and will be glad to have his soil tested. The smart salesman might even agree to pay the testing fees for those who purchase agricultural limestone. After sampling several farms he should take the samples to the soil test laboratory. Soon the test results will be on their way to the appropriate official and the agricultural limestone salesman (distributor) may return to the various farms to complete the sales.

The good salesman will not try to force his customers to buy his product. Instead, he will supply himself with information on the agronomic values of limestone and show the farmer that he cannot afford to do without it. With the soil test results, this will not be difficult.

A year around testing and selling program will keep the trucks busy. It may be possible for the limestone producers to lend a hand. This will surely be true in Michigan where well organized producers and distributors associations are functioning successfully.

Limestone's Part In Effective Soil Treatment

By JOHN FALLOON*

THE TIME IS AT HAND, probably overdue, for applications of agricultural limestone to be made as an essential part, but only a part of an effective soil treatment for soils similar to those in Missouri. This does not mean that the limestone must be applied the same week or even the same season as the other treatment. However, until the full treatment is applied, little benefit can rightfully be expected from the use of limestone only on most soils today.

Properly applied agricultural limestone may perform one or both of two different functions. They are, (1) provide calcium or calcium and magnesium as plant nutrients and (2) improve the acidity reaction of the soil so other nutrients, particularly phosphorus, naturally in the soil or applied in fertilizers, are more available to growing plants. The beneficial effects from limestone is often due to a combination of both of the above influences as both are automatically served at the same time the agricultural limestone is applied. But the benefits of limestone may be from serving only one of the above purposes.

It is only on the very high exchange capacity soils that enough hydrogen can be present to make a quite acid (low pH) soil and at the same time for that soil to hold sufficient calcium, magnesium and potassium to give adequate nutrition to plants. Therefore, on most soils an acid condition is normally an indication of a low fertility level. An application of limestone can supply only calcium or calcium and magnesium if dolomitic limestone is used. Yet there may be a shortage in the soil of nitrogen, phosphorous and/or potassium as well. Since these nutrients and others are essential to plant growth, but are not present in limestone, limestone must be looked upon as only a partial treatment.

A number of farmers and some limestone producers and distributors have been confused by the effects of the first liming on the better soils. The stimulation of bacterial activity because of liming contributes to a greater release of plant nutrients from the soil and results in larger production. At this point the limestone is given much credit. The larger production takes more nutrients from the soil and thus lowers fertility. Production then declines unless the nutrients are replaced in the soil. And at about this time the poorly informed person thinks there is a need to relime. But the second liming is not likely to give such good results as the first, as the effect of stimulation is a thing of the past. So quite likely it is felt that the limestone used the second time was not as good as that used the first time so the land is limed again in the hope of getting some of "that good lime" again. Obviously in such cases it is not a matter of poor quality limestone, but the failure to use a complete fertility treatment as needed.

In the beginning, the top farmers generally limed the better land before the poorer land on their farm. It was on this better land that all the different treatments necessary to grow legumes were used. Good soil treatments were repeated time and again to keep highly productive crops growing well. But as liming spread to more acres, the application was made on poorer land. The poorer land couldn't give the stimulation response to limestone that the better land did and often the poorer land did not get any better, if as good, fertilizer treatment as the other. This all likely meant that the limestone program lost popularity.

Much emphasis is being placed upon soil testing today. Quite naturally many farmers tested their best land first as a basis for making soil treatments necessary to get maximum production from that land just the same as they had limed it first and also used heavy applications of fertilizer on it before they did on their poorer land. Much of this land needs reliming now. Yet some land being tested now needs very little or no lime. This is especially true where in past years limestone was used primarily to earn ACP payments without much regard for a balanced fertility program. Naturally, quite often soil tests on such land show that the first and foremost need is for nitrogen, phosphate and/or potash — not more lime. This is disturbing to many limestone producers. They are now beginning to wonder if the limestone tonnage needed was not over-estimated some years ago. Likely not. However, much of the estimated need is on land that has never been limed or even been considered for liming up to this time. And since this is the poorest land on most farms, complete soil treatment is more essential for increased production than on the previously limed land on most farms.

Other fertilizer treatments cannot replace limestone. Yet limestone supplies only calcium, or calcium and magnesium. Therefore, it is only a partial soil treatment. The future use of agricultural limestone is tied closely with complete soil treatments which can and will give higher yields per acre of quality crops.

*Extension Professor of Soils, College of Agriculture, University of Missouri.

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Oliver Super 88 with HydroTrencher. This trencher has a ½-yard capacity and quick, positive hydraulic control. It digs to 12 feet, loads to 12 feet.

Safety director Harold A. Koop, left, presented trophy to **Emil Seier,** foreman of plant

Company-Employe Cooperation Makes Safety Program Work

By BROR NORDBERG

THOSE WHO THINK THAT SAFETY ISN'T IMPORTANT or that a good record in accident prevention is the result of luck more than effort need to take a good look at the records of the more safety-conscious producers. There could be no more convincing proof, in these industries, of the relation of good safety records to planned effort than the Lyman-Richey Sand and Gravel Corp., Omaha, Nebr.

This concern, with its eleven widely scattered dredging plants, had 72 lost-time accidents over a 2-yr. period in the early 1930's. Following cancellation of its insurance because of a poor record, a safety program was organized that soon proved so effective that the company was re-instated by its insurance carrier.

Harold A. Koop, a long-time supervisory employe, was appointed safety director, inspections were conducted at all plants to determine hazardous conditions, corrective measures were taken accordingly, and a regular program of inspection and safety meetings was inaugurated. Membership was taken in the National Safety Council, bulletin boards were put into use to get across the safety message, and an interplant safety contest with cash awards was established. Each year, a dinner is held for foremen and the key personnel group, at which the cash awards are made. Benefits both to the company and the workers have been rewarding, with improvement of the record, as brought out in previous articles in ROCK PRODUCTS (see May, 1953, issue, pp 80-83 and March, 1955, page 70).

The first year after the organized safety program started, the number of lost-time accidents was reduced to seven. For several of the last few years the company has barely missed achieving its goal of a perfect record for 11 plants and centralized shop.

Plant No. 7 at La Platte, Nebr., was winner of the ROCK PRODUCTS safety trophy awarded in the 1951 National Sand and Gravel Association safety competition, for the best record in the Class C Competition. It was a repeat winner in the 1953 competition and the company was awarded the trophy at the Miami, Fla., convention of N.S.G.A., January 9-13, 1955. Plants Nos. 2A, 5-6, 9-10-11 and 12-13 were certificate winners for that year, having worked without lost-time accidents.

Plant No. 7 operated 48,298 man-hours in 1953 and total man-hours worked for all plants was 491,429. Plant No. 7 had 34,005 man-hours, again without lost-time accidents in 1954, and there were a total of 454,251 man-hours worked without a single lost-time accident in the production plants. A single sprained ankle prevented a perfect company-wide record.

The company takes every opportunity to stress and re-emphasize the importance of safety. Special recognition was given plant No. 7 at the safety award dinner, March 24, 1953, at Omaha, Nebr. All employes of the plant with their wives were seated at a special table, and it was the editor's privilege to present the trophy to foreman Emil Seier.

We were again an invited guest, at the Employe Party and Safety Award Dinner, March 17, 1955, when Mr.

Personnel of plant No. 7 and their wives were honored as a group

Vice president Lewis C. Curtis, presented a broiler to Mr. and Mrs. **Bert Taylor.** Mr. Taylor has been employed 58 years

Stripping costs reduced more than 30% with new-type haulers

18-ton LeTourneau-Westinghouse Rear-Dump is loaded with 4 passes of 3½-yd. shovel.

Kleenbirn Collieries had always hired crawlers and scrapers to strip overburden from their coal beds northeast of Lethbridge, Alberta. Looking for a way to lower costs, the Company several years ago bought 3 C Tournapull Rear-Dumps and a 3½-yd. stripping shovel.

In their first full season (April to November), this team accounted for 578,000 yds. of overburden, sandstone and shale. In the first 3 months of the following season, working a shorter day, the units hauled 112,000 bank yards. Per-yard costs were *less than 35% of the cost* of the last year crawlers were used, and 30% less than *any* of the 10 previous years when crawlers were used. These costs include depreciation and interest on the equipment investment.

Haul up 9½ to 12½% grades

To date, the Rear-Dumps have spent about half their time hauling the dirt and shale overburden pictured, the other half hauling shot sandstone and coal. Loads in clay, earth and shale average 12 bank yards . . . in rock, 9 bank yards. Maximum grades vary from 9½ to 12½%. "These 18-ton LeTourneau-Westinghouse Rear-Dumps are ideal for work with a 3½-yd. shovel," says Foreman W. E. Herrick. "They are the best hauling units for our kind of work."

Rear-Dumps build ramps

One of their most important jobs according to Herrick, is building ramps. Constructed of overburden, these connect pit with spoil pile and coal haul roads. They average 50′ wide, 50′ high, and 250′ long. Not only was their construction long and costly with crawlers and scrapers, but necessary compaction could never be achieved. This caused bad sink-holes to develop. "Now," says Herrick, "with a crawler for leveling and Tournapulls for hauling, we build the ramps much faster. Also, we get better compaction and no sink-holes."

A demonstration on *your* work will show you specifically the many ways LeTourneau-Westinghouse Rear-Dumps can cut haul costs. Call us today to arrange time and place.

Kleenbirn Collieries has been mining coal here since 1919. Seam now being uncovered is 4½ ft. thick. Overburden, mostly shale and clay, is 30 ft. thick. When winter stops mining, LeTourneau-Westinghouse units haul stockpiled coal to bunkers 1½ miles from pit. From here, coal is hauled by truck to nearby towns.

Front-wheel drive, big air brakes, plus the rear dumping action, make it easy for operator to dump entire load cleanly and safely over edge of soft spoil bank.

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Sterling Slo-Speed geared motors, reports Mr. Alan E. Bodycombe, Associate of PRAB Industries of Detroit, engineers and designers of materials handling and automation equipment. Their compactness aids in engineering layout... they have required nothing but minimum maintenance even under extremely adverse conditions due to presence of abrasive dusts, such as exist in sand handling bucket elevator applications.

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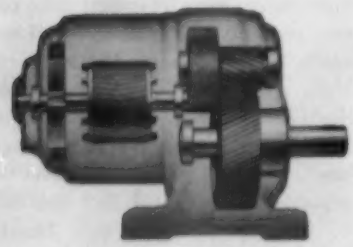

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Seier was presented the 1953 trophy. This was a company-wide party and there were about 230 present.

President Fred P. Curtis was master of ceremonies for an informal program. H. F. Curtis traced the early history and growth of the company in an excellent talk. A study he had made showed that a good number of employes had long service records. The breakdown was 69 percent with five or more years of service, 50 percent 10 years, 29 percent 15 years, 23 percent 20 years, 21 percent 25 years and 11 percent more than 35 years with the company. The veterans were asked to stand and be recognized. Mr. and Mrs. J. W. Taylor were presented a handsome Westinghouse broiler by the company, in recognition of Mr. Taylor's 58 years of service.

Mr. Koop, himself a 42-yr. veteran, presented the trophy and the cash safety awards which are scaled according to comparative accident experience for the intercompany safety competition. Producing plants are all in the state of Nebraska and each has a foreman. General Superintendent A. P. Jones has headquarters at Omaha. The dinner concluded with showing of a colored film on the Carlsbad Caverns by vice-president Lewis C. Curtis.

Pennsylvania Stone Meeting

(Continued from page 82)

bers at this meeting that the original smaller size ballast specification be used to overcome the difficulty. Laboratory officials requested that the industry be canvassed on this change and that a similar report be received from the slag industry.

The directors' meeting requested the general manager of the association to supply each producer with blasting record forms so that such records would be kept in a uniform manner. The flat and elongated problem came in for considerable discussion.

At the annual business meeting of Pennsylvania Stone Producers Association in the afternoon, general manager Wagner gave his report, and Thomas Lalley of Binkley Bros., Inc., presented the treasurer's report in the absence of H. M. Binkley, treasurer.

W. L. Simms, chief of the Mines & Quarries Division, Commonwealth of Pennsylvania, gave an interesting talk on quarry blasting. He mentioned the need for good public relations with adjacent property owners, and emphasized his talk by displaying a large rock which was blasted and thrown through the roof of a house 500 yards from the quarry. This incident was brought about by having an untrained blasting foreman. Only trained men, he said, should be used to handle explosives and supervise blasting. He suggested that all blasters should be trained and licensed before they are allowed to perform this work.

The nominating committee presented a slate of officers for the ensuing year: for president, R. B. Garman, Tyrone Lime & Stone Co.; vice-president, John D. Teeter, John S. Teeter & Sons; treasurer, H. M. Binkley, Binkley Bros., Inc.; and secretary, W. H. Fehr, Berks Products Corp. For the Board of Directors, the following were elected: eastern section, W. E. Wilson, Homman Bros. & Wilson, and J. C. Showalter, Showalter Quarry; central section, Paul E. White, Valley Quarries, and F. I. Narehood, Narehood Bros.; western section, Lewis M. Nauss, The Carbon Limestone Co. and Adam Eidemiller, Eidemiller Enterprises, Inc.

Producers' Conference

The affiliated group, the Pennsylvania Highway Material Producers Conference held its annual banquet and meeting on February 3 and 4 with more than 350 producers and guests in attendance.

Secretary of Highways, Jos. J. Lawler extended an invitation to all producers and suppliers of highway materials to visit his office any time problems arose. William Warrick presented the Chief Engineer's Highway Program for 1955. He pointed out that less than one-half of the Pennsylvania highway system is on the federal system, and that money from current revenues must take care of these roads as well as match the federal aid money for those which are on the federal system. His report gave a complete break-down of estimated quantities of materials which would be required by the Department of Highways in 1955. A total of 8,808,212 tons of aggregate will be required, not including 1,061,669 tons of sand; 1,974,281 bbl. of cement, and 1,755,321 tons of bituminous concrete.

Hon. Henry B. Leader, representative in the Pennsylvania legislature and brother of Governor Geo. M. Leader, substituted for the governor. He asked the producers to help in securing adequate funds for the highway program by supporting such legislation. Lt. Governor Roy H. Furman reviewed his early experience as a contractor, and told about the great benefits derived from the Pennsylvania Turnpike construction. John D. Paul, chief construction engineer, The Pennsylvania Turnpike Commission said that these highways fill one of the greatest needs of our time. They encourage the growth of new industries, and he cited several examples to prove his point.

Dozing river-bottom rock and gravel within reach of dragline, Tournatractor moves up to 2½ cubic yards per push. Material, hauled by truck to crusher, will ultimately be used as finished aggregate on a new section of U.S. Highway 99E, south of Chico.

Mechanical efficiency 95%

1 original tire still working

How many hours' service do you get from a set of tracks?

Whatever the figure, take a look at the record of a Tournatractor owned by Richter Brothers, Oroville, California.

Their machine is about 3 years old. Three of its original tires were replaced at about 7,000 hours. The fourth is still going strong at 8,520 hours! (See right front tire in above photo.)

Remember, too, that Tournatractor's 19 mph speed enables it to cover 2 to 3 times as much ground as your crawler would in the same number of hours.

Richter Brothers have given their versatile Tournatractor the toughest kind of jobs, too.

Tire wear small, even in rock

One recent assignment, for example, involved feeding river-bottom rock, sand, and gravel to a dragline. Here, Tournatractor pushed enough material to the loader to maintain production rate of 700 cu. yds. per 7-hour shift. In spare time, it maintained truck haul road. The abrasive and rocky material had little effect on Tournatractor. Its big low-pressure tires rolled *over* the grit instead of grinding *through* it.

On another assignment, Tournatractor helped 4 Tournapulls move 127,500 yds. of lake-bottom gumbo in 35 days for a levee at Corcoran, Calif.

Averages 15 mph job-to-job

Tournatractor also recently leveled 500 acres of farm land and did such highway construction work as push-loading scrapers, dozing, and pulling compactors. All job-to-job moves were made under rig's own power . . . a typical trip, Corcoran to Oroville, Calif. (300 miles), took only 20 hours. In 3 years, the machine has been 95% mechanically efficient, according to the owner. Says William C. Richter, owner also of 7 Tournapulls, "We have very little downtime with LeTourneau-Westinghouse equipment."

Says Operator Earl Sheppard, "I like Tournatractor especially well for dozing, clean-up work, and push-loading. It's fast and easy to operate."

Ask us to show you and your operators what these advantages can mean on your job. Call to arrange a demonstration.

On levee job near Corcoran, Tournatractor push-loads electric-control C Tournapulls with 11 pay yards of heavy, wet, lake-bottom gumbo in 30 seconds.

Tournapull—Trademark Reg. U.S. Pat. Off.
Tournatractor—Trademark T-661-5-bw

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

The large capacity, long working range and easy maneuvering of the 480-W walking dragline help make it ideal for the profitable handling of big-yardage stripping. Built into this new model are the same advanced features that have earned for Bucyrus-Erie walkers a world-wide reputation for outstanding performance.

There's the exclusive Bucyrus-Erie walking mechanism for easy, accurate move-ups, and the balance of weight and loads that keeps the center of gravity well within best working limits. The large bearing area of the big circular base permits working close to banks and on soft ground in any weather. Main machinery is simple, with a minimum of moving parts, and is held firmly in alignment. Let us show you how the 480-W can give you big-yardage stripping at moderate cost.

Available with Ward Leonard Electric or Diesel Power and three combinations of bucket size and boom length 19L54

Boom Length	Bucket Capacity	Distance Material Can Be Moved *
215 ft.	8 yd.	431 ft.
195 ft.	10 yd.	395 ft.
175 ft.	12 yd.	359 ft.

*without throwing bucket. Digging depths range up to 141 ft.

Walking Draglines . . . SOUTH MILWAUKEE

BUCYRUS ERIE

. . . 4- to 30-cu. yd. capacity WISCONSIN

INFORMATION

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

1 **A-C MOTORS** — General Electric Co. has released a 28-page catalog, No. GEC-1026, presenting buying information on standard a-c fractional and integral horsepower motors. Photographs, ratings, book prices, dimensions, weights, frame numbers and standard modifications are included.

2 **AIR POLLUTION** — Air Pollution Control Association has released its annual meeting paper, No. 54-25, entitled "Development Of A System For Predicting Dispersion From Stacks." Photographs, charts, and diagrams are included.

3 **AUTOMATIC PROPORTIONING** — Richardson Scale Co. has prepared Bulletin 0351, describing and illustrating the Select-O-Weigh proportioning system, detailing 11 installations in varied operations. Forty-seven photographs and engineering drawings illustrate the installations, and design and operating characteristics are explained.

4 **BITS** — Brunner & Lay, Inc. has released a bulletin, No. B-1, describing X-type, tungsten-carbide Rok-Bits, available in 3½, 4 and 4½-in. gauge sizes, to fit on 1½ and 2-in. drill rods.

5 **BOILER COMPOUND** — Edick Laboratories has announced the publication of a data sheet on its boiler compound "E-D #4," giving detailed explanation on boiler water treatment.

6 **BOILER REFRACTORIES** — The Babcock & Wilcox Co., Refractories Division, has issued Bulletin R-36, designed as a guide for boiler refractory selection. Basic refractory requirements and critical areas in boilers are discussed, as well as causes for refractory failures. Description and properties are given for firebrick, insulating firebrick, refractory castables, plastics, and mortars.

7 **BRAKE SERVICE** — Raybestos-Manhattan, Inc., Raybestos Division, has published a 52-page Brake Service Guide, giving a seven-point brake check program, and outlining basic fundamentals of brake service and brake systems. Line drawings, and a four-page "trouble shooting" chart are included.

8 **BULK HANDLING** — The L. C. L. Corp. has published a booklet entitled, "Air Activated Containers — The Modern Method of Handling Materials in Bulk," on the standard type steel container for handling various types of free flowing granular materials. Loading and unloading, shipping mediums, typical applications and advantages are described and illustrated.

9 **CENTRALIZED LUBRICATION** — The Farval Corp. has released Bulletin 16, describing and illustrating the advantages of Multival centralized lubrication for small machines or equipment with a limited number of bearings. Installation data is also included.

10 **COMPRESSORS**—Westinghouse Air Brake Co., Le Roi Division, has issued a 12-page catalog, No. CG-9A, illustrating the 40 models of portable type compressors. A reference chart shows capacities, engine types and mountings, and various compressor features are given.

11 **CONTROLLERS** — The Foxboro Co. has prepared a 12-page bulletin, No. 5A-13, describing the Model 41A pneumatic indicating controller. The proportioning mechanism is diagrammed and explained, typical applications are shown, and specifications are listed.

12 **CRANE-EXCAVATORS** — American Steel Dredge Co., Wayne Shovel and Crane Div., has issued two bulletins, No. 424, describing the features of the Model 70 crawler-mounted machine, and No. 425, on the 50A and 50B truck-mounted models. Both bulletins give specifications, lifting capacities and overall dimensions for the ¼-cu. yd. machines.

13 **CRANE** — Dixie Crane and Shovel Co., Inc. has brought out Form 541A, describing and illustrating the ½-cu. yd. shovel, trench hoe, and 5-6 ton crane. Advantages are listed, and diagrams and tables are given.

14 **DIAPHRAGM PUMP** — Rice Pump & Machine Co. has brought out Bulletin 55DP, describing and illustrating a 4-in. diaphragm pump which combines two single units to double the pumping capacity. Specifications and capacities are included.

15 **DIESEL ENGINES** — Ingersoll-Rand Co. has released a 20-page bulletin, Form 10,040, describing the features of Type "S" and "SS" heavy duty diesel engines in sizes from 375 to 1000 hp. Included are specification and dimension sections, and illustrations of the engines and component parts.

16 **DOZER EQUIPMENT** — Hensley Equipment Co. has published a catalog and price list, No. HC-54-A, for twin-shank dozer rippers, clearing units and brush rakes, scraper rippers, dozer end bits, water pump replacement parts, grouser shoes, miscellaneous parts, etc. Illustrations and specifications are given.

17 **EARTHMOVING EQUIPMENT** — Caterpillar Tractor Co. has brought out Form D480, entitled "Handling Clay the Profit Way," covering operations with track-type tractors, shovels, wheel tractors, motor graders, and engines. Action photographs are given.

18 **EMPLOYE ELEVATORS** — Humphrey Elevator Co., Inc. has brought out a folder illustrating and describing the four standard models of Manlift elevators. Application photographs are given, and safety features are described.

19 **ELECTRIC LIFT TRUCK** — The Yale & Towne Manufacturing Co., Materials Handling Division, has brought out Bulletins 5111, 5112, and 5113, describing the specifications and aspects of operation of the Model E-46 electric, stand-up, hydraulic lift truck, in 2000, 3000 and 4000 lb. capacity models.

20 **FLOTATION MACHINE**—Denver Equipment Co. has brought out Bulletin F10-B87, describing and illustrating the "Sub-A" Super Rougher flotation machine. Dimensions and specifications are included.

21 **IDLER** — Joy Manufacturing Co. has announced Bulletin LD-103, describing and illustrating the Limberoller flexible, two-bearing suspension idler for above or below ground belt conveyors. Typical applications are shown, and diagrammed drawings and tables are given.

22 **ILLINOIS MINERAL INDUSTRY** — The State Geological Survey has published a 42-page booklet, "Illinois Mineral Industry in 1953," a summary of the output and value of Illinois mineral products and minerals processed but not mined in Illinois, including stone, lime, cement, clay products, sand, gravel, silica, fluorspar and metals. The economic analyses of the industries include maps, tables and graphs.

23 **INDUSTRIAL INSTRUMENTS** — Minneapolis-Honeywell Regulator Co., Industrial Division, has issued Catalog 5002, describing and illustrating its industrial instruments and equipment, including the latest developments.

24 **LIQUID LEVEL GAUGES** — The Bristol Co. has published a 26-page bulletin, No. L701, illustrating and describing its line of liquid level gauges for indicating, recording, controlling, and telemetering. Engineering and installation data is given.

25 **LUBRICATION** — The Texas Co. has published Vol. XLI, No. 4 of "Lubrication," featuring an article entitled "Lubrication — Specification and Classification." Tables are given listing viscosity values for crankcase oils, for transmission and axle lubricants, etc. Performance specifications and recommended lubrication practices are discussed.

26 **MASONRY WALL REINFORCING** — Adrian Peerless, Inc. has issued Bulletin 3079, describing and illustrating Wal-Lok deformed and knurled, masonry wall reinforcing. Photographs and results of pull, side pressure and shrinkage crack tests are given. Specifications are included.

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27 **MATERIALS HANDLING EQUIPMENT** — Towmotor Corp. outlines materials handling problems and their solutions with illustrated stories in the January, 1955 issue of "Materials Handling Illustrated." A photographic report on materials handling progress in industries throughout the world is also included.

28 **MOTOR CONTROL** — General Electric Co., General Purpose Control Dept., has announced a 68-page catalog of general purpose control devices, including a section correlating by horsepower components for each type of motor control application. Wiring diagrams, and dimensions on motor starters, etc. are given.

29 **MOTORPUMPS** — Ingersoll-Rand, Cameron Pump Division, has released Form 7093-E, covering the line of close-coupled Motorpumps from ½ to 75 hp. sizes for delivery of 5 to 2800 g.p.m. Dimension, weight, performance, mounting, and pipe friction tables are given, and typical pumping problems and solutions are included.

30 **MOTORS**—Reliance Electric and Engineering Co. has announced a 12-page bulletin describing and illustrating the Super "T" line of d-c motors with "Dynamic Response." Speed range, speed and rate of acceleration, various enclosures, selection data, and dimensions are given.

31 **POWER TRANSMISSION** — The American Pulley Co. has announced four catalogs: No. WBC-55-2 on Wedgebelt drives; No. CPC-55-2 on conveyor pulleys; No. SRC-55-2 on Shaft-King speed-reduction drives; and No. FBC-55-2 on flat-belt drives. Each catalog is illustrated, and contains selection and dimensional data as well as engineering information.

32 **PRODUCT LINE** — Harnischfeger Corp. has prepared an illustrated bulletin, No. G-15, giving descriptions and capacities of P & H products, including overhead cranes, electric and chain hoists, arc welders, welding electrodes, power shovels, soil stabilizers, diesel engines, etc., and also giving details on P & H prefabricated homes. A large-size map shows locations of plants, branches, warehouses and parts depots, sales offices and dealers.

33 **PROTECTIVE EQUIPMENT**—General Scientific Equipment Co. has released the 1955 issue of "Everything in Safety," a catalog of personal protective equipment and industrial safety devices. The 130-page catalog covers respiratory devices, eye protection, hats, gloves, carboy pumps, drum pumps and miscellaneous industrial safety equipment.

34 **REFRACTORIES** — Kaiser Aluminum & Chemical Sales, Inc., Chemicals Division, has prepared an identification guide for Permanente refractories, showing the colors that identify the various types of basic refractory brick, and lists the name, number and other identification of sacked ramming mixes, bonding mortars and furnace grains. Data is also given on classification, application and special features of each refractory product.

35 **ROLLED STEEL RINGS**—Edgewater Steel Co. has published a 12-page bulletin on rolled steel rings for bearing races, gears, pipe flanges, rotary kiln tires, etc. A simplified presentation of the company's manufacturing process is given, as well as illustrations of representative shapes and various production processes.

36 **SCRAPERS** — Caterpillar Tractor Co. has announced Form DZ528, illustrating and describing its line of scrapers. Typical application photographs are given.

37 **SHOVEL-CRANE** — Power Crane and Shovel Association has announced a booklet entitled, "125 Ways to Better Power Shovel-Crane Operation," which is available at a cost of 15¢ per copy, by writing to the association at 74 Trinity Place, New York 6, N. Y. It is free of charge to students in engineering schools and colleges, as well as members of the International Union of Operating Engineers and their Locals.

38 **STAIR TREADS** — Wooster Products Inc. has announced its 1955 catalog on the line of architectural metal items for stairways and walkways, including stair treads and thresholds. Cross-sectional drawings are given, and repair information is included.

39 **STEEL BUILDINGS**—Armco Drainage and Metal Products, Inc. has issued a 24-page manual, No. SX-2054, covering the Series S, Type 1, 2 and 3 steel buildings, multiple-span buildings, and lean-to units. Accessories are described and illustrated and instructions are included for erection and finishing.

40 **SWITCHGEAR**—General Electric Co. describes and illustrates metal-clad switchgear in a four-color, 52-page publication. Detailed discussion of applications, installation, maintenance, design features, accessories, etc. is given. Dimension and weight tables are also included, as well as foundation data and guide form specifications for various applications.

41 **TRACTOR** — Caterpillar Tractor Co. has issued Form 31496, describing and illustrating the Model D8 tractor in torque converter and direct drive models. Specifications are included.

42 **TRACTOR SHOVELS** — Clark Equipment Co., Construction Machinery Div., has issued Catalog 7500-P, describing and illustrating the design, construction, operation and application of Michigan '75' tractor shovels. Optional attachments are given, and a range chart gives dimensions of all major attachments.

43 **V-DRIVES**—Fort Worth Steel and Machinery Co. has issued an engineering guide, No. 50-B, giving simplified formulas for standard quarter-turn and V-flat drives. Engineering information on other types of V-belt drives is also included.

44 **VERTICAL MOTORS**—U. S. Electrical Motors Inc. has issued Bulletin 1868, graphically illustrating the improved types of vertical solid shaft motors, including the Unimount motors in ratings from ¼ to 400 hp. in grease and oil lubricated types. Cross-sectional views in full-color are also included.

45 **VIBRATING SCREENS** — Link-Belt Co. has published Book 2554, covering a complete line of vibrating screens for medium and heavy-duty screening operations. Capacity charts and engineering information are included.

46 **WEIGHER** — Richardson Scale Co. has brought out Technical Reference 54E, describing and illustrating a shrouded, large draft batching scale for measuring dry materials. Various uses, types of materials handled, sequence of operation and operating features are listed.

47 **WELDING CHART** — Stulz-Sickles Co. has brought out a 24- x 36-in. wall chart, featuring actual-size illustrations of Mangonal Wedge bars, to aid in determining the correct wedge bar to be used in rebuilding worn teeth. Dimensions and estimated weights of the bars are listed, and specifications for hot rolled plates are included.

48 **WELDING SUPPLIES—ACCESSORIES**—Air Reduction Sales Co. has brought out a 36-page catalog, Form ADC 948, covering the line of arcwelding and oxyacetylene welding supplies and accessories.

49 **WHITE CEMENT** — Medusa Portland Cement Co. has released the "Medusa White Portland Cement Catalog," giving general information and specification data on construction procedures. Included are federal and A.S.T.M. specifications and typical construction illustrations. Cement advantages are also discussed.

50 **WIRE BELT CONTROL** — Knapp Mills, Inc., Guidler Division, has issued a technical paper entitled "Selvage Damage to Woven Wire Belting; Its Cure and Correction," by Danckert Krohn-Holm. It describes and illustrates the Guidler, a patented control mechanism for use with woven wire belts.

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NEW CHEVROLET *Task-Force* TRUCKS

Choose the model that's matched to your job. You'll get the most modern engineering features in the industry—and a lower ton-mile hauling cost! Your Chevrolet dealer is ready to supply full details of these important features. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

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For the first time, heavy-duty trucks with their own individual styling—a brawny design that matches the job! New Flite-Ride cab (even more durable!) features a Sweep-Sight windshield, High-Level ventilation and concealed Safety Step running board.

New Capacity—New Standard Width Frames!

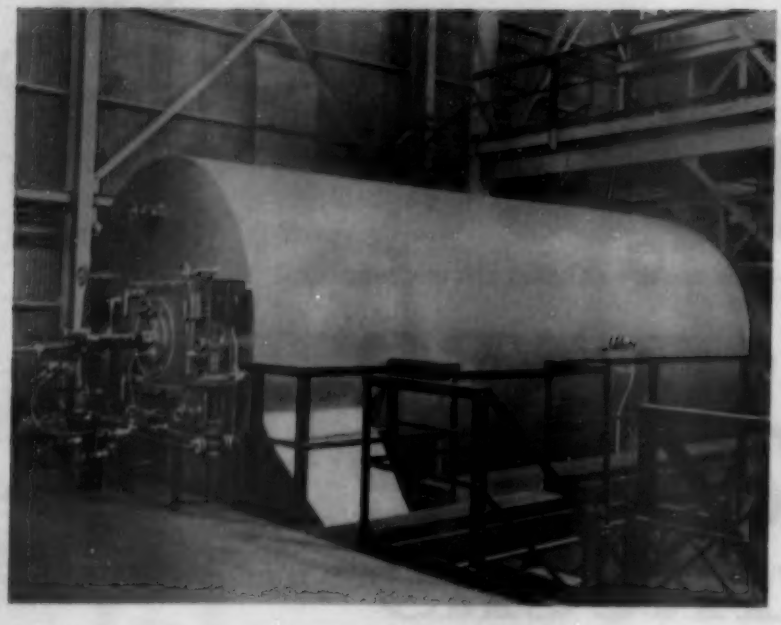
New capacities go all the way up to 18,000 lb. G.V.W. (in 2-ton models). Get this hefty two-tonner and cut operating costs on heavy hauling jobs! All models have new, more durable, 34-inch ladder-type frames with full-length parallel side members.

New Engines—New Ride!

A new 12-volt electrical system sparks all six new Task-Force engines. That means faster, surer starts; increased generator capacity. New suspension, front and rear, provides a smoother, more stable ride.

New Power Steering—Power Brakes!

Driving's easier and safer with these Task-Force power helpers. Power Steering is available on all models as an extra cost option. Power Brakes are *standard* on 2-ton models; optional at extra cost on all others.



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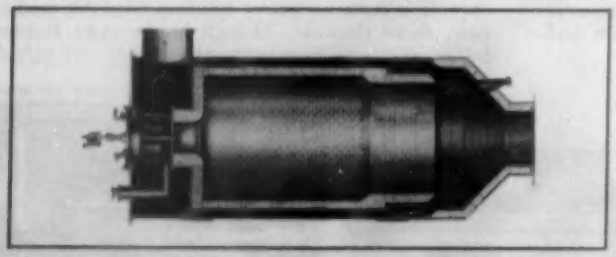
WITH PEABODY AIR HEATERS

Fast, efficient, drying of 1600 tons of phosphate rock per day is one of the many instances of the successful use of Peabody Air Heaters in the Rock Products industry. The Peabody design maintains maximum production levels day after day, while insuring highly efficient and economical operation with minimum outage. Peabody, a leader in the combustion field, furnishes Air Heaters with air cooled cylindrical furnaces for many types of rotary kilns, and also oil and gas burning equipment for firing directly into such kilns. For further details write direct—illustrated bulletin available on request.



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6-091

Burning Cement Raw Materials

(Continued from page 72)

of this difference between the melting point of a crystalline compound and the temperature at which a mixture becomes completely liquid, we prefer to term the latter the "temperature of complete fusion."

The significance of the various points, curves, and areas in the diagram may be understood by considering one of the methods of locating them. Let us suppose that we are starting out with no knowledge of phase relations in the system CaO-Al_2O_3-SiO_2, which we propose to investigate. All that we have at the outset is the triangle, with CaO, Al_2O_3, and SiO_2 designated at the vertices. Mixtures represented by points in the diagram are heated until completely liquified. Upon cooling, crystalline phases separate out. Usually only one crystalline phase separates out at first, and this is followed by the appearance of others as crystallization proceeds. The first one to appear is known as the primary phase. A particular crystalline phase may be the primary phase for liquids in one region of the diagram, while another crystalline phase may be characteristic of another region. The problem is to map out these "primary phase regions." A large number of compositions must be investigated to establish the boundaries between the primary phase regions. In each region the primary phase must be identified. A common method is to heat each mixture until it is completely melted, then cool to a temperature slightly below the temperature of complete fusion. The mixture is then "quenched" — that is, cooled so suddenly that further crystallization does not occur. The mixture then consists of glass, in which the primary phase crystals are imbedded. The identity of the crystalline phase is determined by its optical properties, as observed microscopically.

In the course of locating boundaries between primary phase regions and identifying the primary phase in each, the temperature of complete fusion of each mixture is observed and recorded. At this stage the boundaries of the primary phase regions have been drawn in the diagram, the primary phase in each region has been indicated, and the observed temperatures have been used to locate isotherms, as in Fig. 3.* All of the experimental data are now shown in the diagram, but there are some further steps involved in completing Fig. 3, for convenience in the interpretation of the diagram. The composition of each

*All temperatures in this paper, both in figures and text, are expressed in degrees Centigrade.

New *simplicity and sustained efficiency in dust filtering and collection...*

Dualaire*

REVERSE-JET DUST COLLECTOR

Efficiencies up to 99.99%

Cloth filter systems of one design or another have long been used by industry for cleaning industrial gases and/or recovering dust or other suspensions. But three problems are common to such systems... (1) Extreme changes in pressure drop and filtering efficiency as dust cakes accumulate on the filter surface... (2) Wide pressure fluctuations and surges in the plant system as filter units become clogged or are cut out and rapped for cleaning... and (3) Rapid deterioration of the filter material by the vibration, shaking and rapping equipment used for cleaning.

But now the DUALAIRE Collector—as engineered by Western Precipitation, pioneers in the field of dust recovery—provides the answer to these and other problems common to conventional bag-house equipment.

The Dualaire Principle is Simple, Efficient. Basically, each Dualaire filter unit consists of a cloth or felt tube, open at both the top and bottom. (A) Dust-laden gases enter at top of the tube and are filtered as they pass through the side walls of the tube to the exhaust system. (B) Dust particles collect on the inside of the tube and before the cake builds up sufficiently to affect filter operation, a tubular blow ring (C) automatically starts moving up and down the outside of the filter cylinder. A jet of air, concentrated by this blow ring, reverses the normal gas flow at the point contacted by the ring, thus jetting the dust layer off of the inner surface of the filter tube.

This jetting action is further assisted by a flexing of the filter cylinder as the blow ring passes, thus cracking and loosening the dust layer from the inner surface, from where it drops to the recovery chamber below the bottom of the tube.

The entire operation is positive and simple. The blow ring starts its action automatically as soon as the dust layer causes a pre-determined pressure differential. And after the filter surface is cleaned, the blow ring automatically stops.

6 ADVANTAGES OF DUALAIRE DESIGN...

PRESSURE DROP remains uniformly low at all times because the dust is removed continuously in small portions.

FILTERING EFFICIENCY remains uniformly high at all times without the "choking" action characteristic of conventional bag-houses. Actual field tests show efficiencies as high as 99.99%!

DUST RECOVERY is in steady increments — not in sudden large "batches" as with conventional rapping systems. Thus the Dualaire eliminates surges and detrimental variations in the plant system.

FILTER ELEMENT has a much longer life because it is not subjected to the stresses of rapping or jarring while being cleaned. Dualaire reverse-jet cleaning action is gentle, yet far more effective.

GREAT SAVINGS are also made in space and the size of installation required. Because each Dualaire filter unit is cleaned more-or-less constantly without shut-down, there is no need for costly standby units — or the complicated switching equipment to cut standby equipment in and out.

BASIC UNITS are "sectionalized" and are available in 5 standard heights. Sections can be bolted together in any desired multiple, providing a capacity range to fit virtually any requirement. As needs increase, add more sections.

There are many other advantages built into the DUALAIRE. *For further details send for this descriptive 12 page booklet. Or contact your nearest Western Precipitation representative!*

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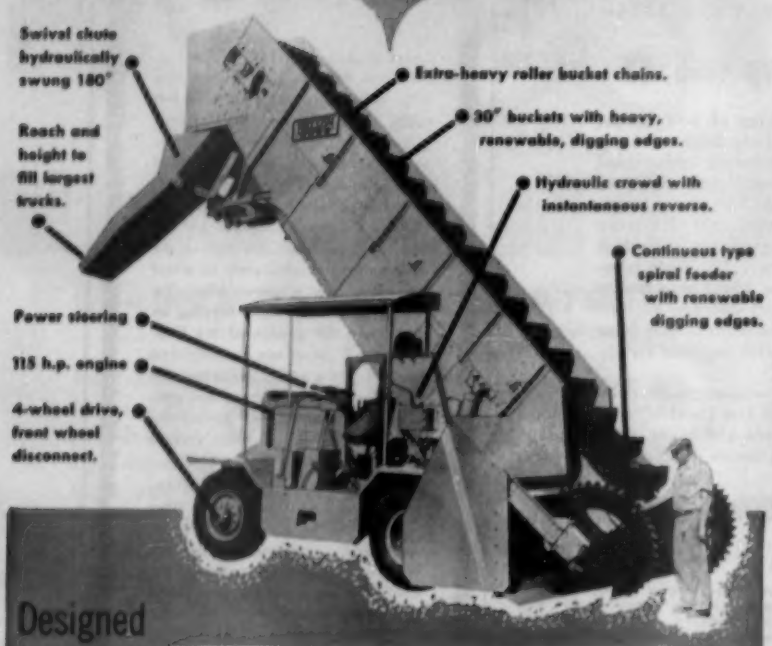
Swivel chute hydraulically swung 180°
Reach and height to fill largest trucks.
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30" buckets with heavy, renewable, digging edges.
Hydraulic crowd with instantaneous reverse.
Continuous type spiral feeder with renewable digging edges.
Power steering
115 h.p. engine
4-wheel drive, front wheel disconnect.

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• All of these features packed into a big, rugged, 38,000 lb. loader permit handling of tremendous volumes of material at lowest cost per yard . . . Practical if you load only 1,000 tons per day—yet can easily handle *up to three times that amount!*

Will pour *10 tons per minute* into the largest trucks without 'jockeying' under chute, distributes it evenly from front to rear. One man controls entire operation . . . Moves under own power at 20 m.p.h. speed!

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crystalline phase is calculated from its chemical formula, and a point representing that composition is located in the diagram. For example, $3CaO \cdot Al_2O_3$, or tricalcium aluminate, is one of the primary phases. Its composition is 62.26 percent CaO, 37.74 percent Al_2O_3, and it is located on the base at a point such that its distance from the CaO vertex is 0.3774 times the length of the base. Points representing the other primary phases are located in a similar manner.

Another addition to the diagram is the system of dotted lines separating the diagram into smaller triangles representing final products of crystallization. In the case of each triangle the crystalline phases at its vertices are the crystalline phases present in all compositions within the triangle when crystallization is completed in a slow cooling operation. A definite plan is followed in determining which points representing primary phases should be connected by straight lines. If two primary phase regions are adjacent, a line is drawn between the points representing those phases. For example, the primary phase regions for $CaO \cdot Al_2O_3 \cdot 2SiO$ and Al_2O_3 adjoin. A line is therefore drawn between the points representing those phases.

The interpretation of the phase diagram is simplified by the assumption that the crystalline phases are pure compounds. According to Rankin and Wright,[3] solid solution "occurs only in the case of $CaO \cdot SiO_2$ and then only to the extent of 2 percent with each of the compounds with which it is associated; namely, SiO_2, $3CaO \cdot 2SiO_2$, $CaO \cdot Al_2O_3 \cdot 2SiO_2$, and $2CaO \cdot Al_2O_3 \cdot SiO_2$." This does not involve the portion of the system in which we are interested. However, the fact that the boundary between the αC_2S region and one of the βC_2S regions in Fig. 3 is clearly not an isotherm indicates that solid solution in the C_2S phase influences the α-β inversion temperature. This is also shown in Rankin and Wright's Table VI. The assumption that the crystalline phases are pure compounds is not strictly correct. However, the extent of impurity in the crystalline phases in the ternary system is not sufficient to necessitate taking it into account in the interpretation of the ternary phase diagram with reference to the manufacture of portland cement clinker. We shall, therefore, continue to treat the crystalline phases as pure compounds.

In describing a procedure by which the various regions in Fig. 3 may be mapped out, we emphasized that all liquids in any particular region are alike with reference to the first crystalline phase which appears upon cooling. That emphasis was necessary because we were describing a procedure

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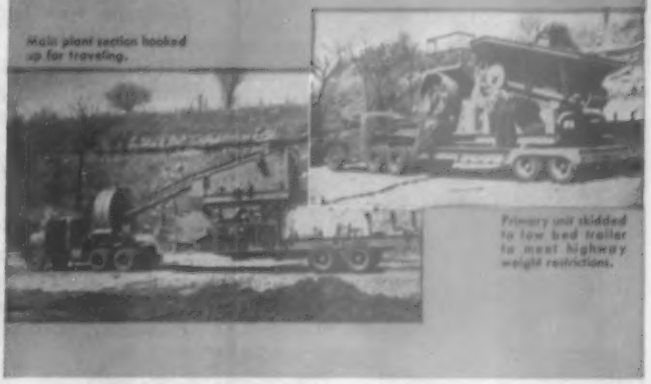
The primary jaw crusher, apron feeder with grizzly by-pass, operator's platform and structural supports are all mounted as a single unit on skids. This primary unit is bolted to the main truck frame. When highway weight limitations must be met, this unit may be quickly skidded to a low bed trailer and transported separately.


Main plant section hooked up for traveling.
Primary unit skidded to low bed trailer to meet highway weight restrictions.

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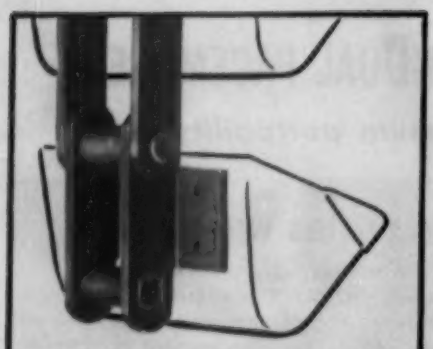

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RECORD TONNAGES result from such Manitowoc features as easy spotting over the trucks which is a natural because of the Manitowoc disc type swing and travel clutches. They're smooth without jerking or grabbing and are precise for exact spotting. They need no readjustment for temperature changes.

BETTER RECORDS are easy because Manitowoc air controls were designed to eliminate operator fatigue. A small compressor driven by the engine supplies low pressure filtered air to operate all main clutches. Variable pressure valves retain the feel of the machine and the entire unit is simple, fool-proof, and easy to maintain.

REAL RECORDS go hand in hand with more power *at the dipper.* Manitowoc achieves additional power with under-drive sticks . . . fewer gears . . . and slide pinion drive. The firm mesh of crowd pinions and stick racks is the result of upward pressure of the sticks when digging. This is true only with underslung sticks. Upward force in this action minimizes pressure and power losses at the roller . . . Also — sticks roll through saddle blocks on four adjustable rollers; no wasted power here!

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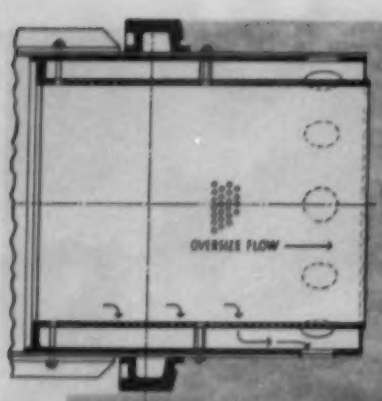

First Olson trommel was installed in YUBA 8 cubic foot dredge (below) at Platinum, Alaska. This trommel (left) mounts in same area normally blanked out and increases capacity as much as 25% without lengthening screen.

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4½ YEARS USE AND 5,000,000 YARDS HANDLED BY YUBA-BUILT OLSON TROMMEL WITHOUT DOWNTIME

L. F. Barber, chief mining engineer, Goodnews Bay Mining Co., writes:

"The Olson section installed in the 7½ foot Trommel Screen, Yuba Dredge No. 129, has now been in operation in excess of four and one-half years...almost five million cubic yards of material have passed through the screen.

"The Olson section was designed to provide additional screening area over the screen section normally blanked out by the lower tread ring and end plates. The effective screening area now extends nearly the full length of the screen, allowing additional flexibility in the routing of screened material over jigs and sluices in the recovery system. The ¾" Yuba Abrasion Resisting Steel internal perforated plates of the Olson section wear in excess of two mining seasons. Plates are changed during Spring repair every other year to preclude lost time during the mining season.

"Regardless of material – whether sticky clay, muck, overburden, fine sand or gravel – the Olson section has not plugged up nor caused any lost time since its installation in 1950."

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Olson patented trommels, made from ARS plate with holes taper drilled to size and spacings you need, can be field mounted in your present screen or built into new screens at the YUBA plant. In either case you increase screening capacity and effectiveness without lengthening screen. Send screen details, general arrangement, hole size and spacing for estimates. No obligation.

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88

in which the essential operation is determination of the first, or primary, phase. However, interpretation of the phase diagram involves a more precise concept of the significance of the regions, their boundaries and intersections of the boundary curves. To illustrate, let us consider the CaO primary phase region in Fig. 4,** which is a portion of the phase diagram in Fig. 3. Liquid R on the 1700 deg. isotherm can exist by itself as a liquid at that temperature, or it may exist at equilibrium with any quantity of crystalline CaO at that temperature. That is, a mixture of liquid R and solid CaO may be maintained at that temperature indefinitely without the occurrence of any reaction. All mixtures of liquid R and solid CaO are on the dotted line CaO-R. Therefore, all mixtures on that line between CaO and R are composed of solid CaO and liquid R when equilibrium is attained at 1700 deg.

**In Fig. 4 abbreviated formulas are used for compounds of CaO, Al_2O_3 and SiO_2. These oxides are designated as C, A, and S, respectively. Thus, $C_2S = 2CaO \cdot SiO_2$; $C_3S = 3CaO \cdot SiO_2$; $CA = 3CaO \cdot Al_2O_3$; and $C_{12}A_7 = 12CaO \cdot 7Al_2O_3$. These abbreviated formulas will be used in the remainder of the article to be published in later issues.

(1) G. A. Rankin and F. E. Wright, Am. J. Sci., (4) 39, 1-79 (1915).
(2) L. A. Dahl, Rock Products, 41, 10, 46-7 (1938).
(3) N. L. Bowen and J. W. Greig, J. Am. Ceram. Soc., 7 (4), 238 (1924).
(4) J. W. Greig, Am. J. Sci., (5) 13, 35-41 (1927).
(5) W. Eitel and W. Bussem, Zeit. Kristallographie, 95, 175 (1936).
(6) B. Tavasci, La Chimica e l'Industria, 17, 461 (1935).

(To be continued)

Labor Relations

(Continued from page 35)

max on Ryan contracts. The major cost item was rental for Ryan's heavy equipment which was furnished with operators, and Lee Ryan testified that in cases where the operators' wage rates were increased his firm absorbed the difference. Ryan, like many of the other contractors having cost-plus arrangements with Climax, often advised Climax in advance when it contemplated an upward revision of wages and received assurance that Climax would not object to the resultant increase in reimbursable costs. Under the usual contract, however, Ryan was not required to give Climax notice or obtain its consent to prospective wage changes, and increases even in reimbursable items were not infrequently effected before Climax was notified.

"Upon the foregoing facts, the Board found that the relationship between Ryan and Climax was that of independent contractor and that Climax had only negative control over Ryan's wage rates.

"Climax enjoyed harmonious relations with respondents and with the union representing its own employes

(Continued on page 114)

Cost Per Ton Broken Cut 58%

with 50-R Rotary Drill

Drill	Bit Size	Rock	Feet per Shift	Cost per Ft. Drilled	Cost per Ton Broken
Rotary Drill "X"	6-⅜ & 7-⅜	Average & Hard	110	0.95	.053
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Records of drilling performance and costs for two rotary drills, working in a quarry operated by a large cement company in the Far West, revealed this remarkable performance record for a 50-R drill — a reduction of 19 cents per foot drilled; a 58% reduction in the cost per ton broken!

This is just one of many case histories which are proving the drilling superiority of the 50-R daily. Behind performance like this are these outstanding features:

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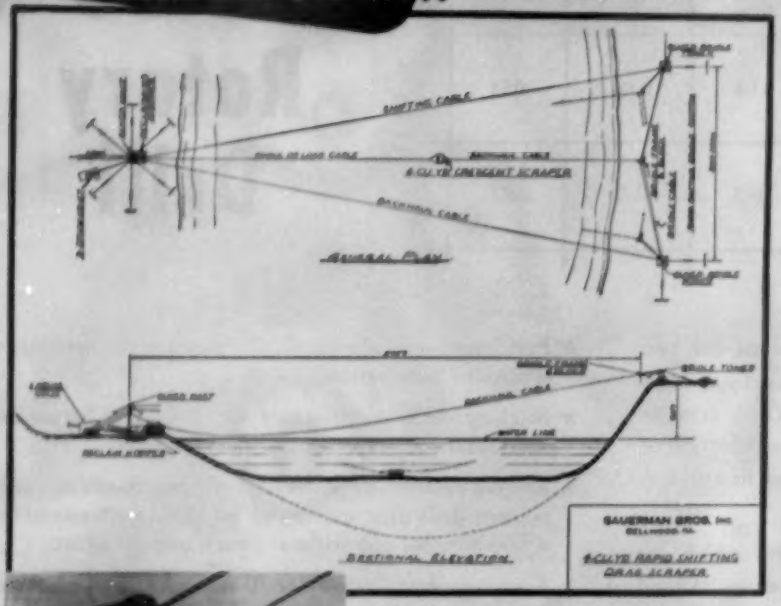

Above drawing was prepared for a specific drag scraper installation and does not represent maximum spans.

View shows rapid shifting bridle frame and all operating cables. Crescent may be seen in background conveying load to reclaiming hopper just in front of mast.

•

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The Sauerman Method works equally well over widely differing areas and span limits . . . on hills, swampy ground or underwater . . . handles any material a dragline can dig.

Every scraper machine is powered by a Sauerman Roller Bearing Hoist, especially designed to withstand sudden shocks and changes in speed.

When a rapid shifter is used, a third hoist drum is added to shift the bridle frame. The rapid-shifting bridle system (upper right of drawing) permits frequent shifting of the scraper's line of operation in non-caving material, shallow excavations or overburden.

Operating costs are lower—basically, it is cheaper to drag material than it is to lift and transport it. You eliminate the power costs of moving heavy machinery about the area. You pay only for pay loads—not dead weight. When expendable parts—sheaves, clutch or brake linings—are replaced, the machine is restored to practically new condition.

Sauerman can help you select the method of materials handling most profitable for your job—a system that will give you the lowest cost per cu. yd. handled.

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at all material times herein. A long-standing dispute between respondents and Ryan came to a head in July, 1953. Ryan was the only nonunion contractor on the Climax project. In August, 1952, Climax had met with representatives of respondents to investigate reported threats that a picket line would be placed on construction work at Climax if contractors did not put pressure on Climax to force Ryan to become unionized. When asked if this was true, Council Secretary Clifford Goold replied that 'anything necessary would be done' to bring about a solution of the Ryan problem. Goold admitted at the hearing that respondents might also have asked Climax to get rid of Ryan, adding: 'I don't recall that we were harsh about it. We were more interested in organizing Ryan's men than we were in hurting business.' In response to respondents' request for more leeway to solicit Ryan's employes on the Climax premises, Climax agreed to furnish its recreation hall for an organizational meeting. The meeting was held in August, 1952, but the Ryan employes proved completely unreceptive to union organization.

Picketing

"Ryan's use of nonunion labor and its allegedly substandard wages became a matter of such concern to respondents in the 1953 construction season that their respective business agents in a July 29 meeting presided over by Goold, voted to picket 'the project' on July 31. That same night, Goold and Ironworkers' Agent Fitzwater met with representatives of Climax and Contractors to discuss an Ironworkers walkout which was unrelated to the issue here. After an amicable agreement had been reached as to the Ironworkers' dispute, Goold remarked that certain contractors at Climax had 'substandard' wages and working conditions. Goold, who at that time was unfamiliar with Ryan's wage rates, equated 'substandard' with 'nonunion.' When a Climax official asked if he meant any of those present, Goold replied that he did not, but that they might all be affected in the future unless the situation was changed.

"In a subsequent conference with Climax alone, Goold admitted that he had been referring to Ryan, stating further that it would be desirable if steps were taken to unionize Ryan's employes. Upon Climax's refusal to interfere with Ryan's labor relations, Goold asked if Climax could obtain a union contractor to replace Ryan. Despite Climax's reply that Hesser, a union contractor who had done similar work for Climax, was engaged in construction elsewhere at the time,

(Continued on page 118)

Successful Mine Operator Endorses Spencer Product

Bank-shooter charging drillhole with Akremite, Maumee Mine No. 20.

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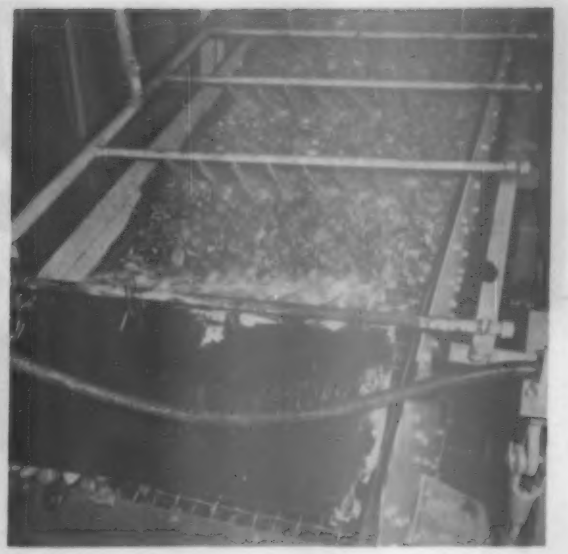

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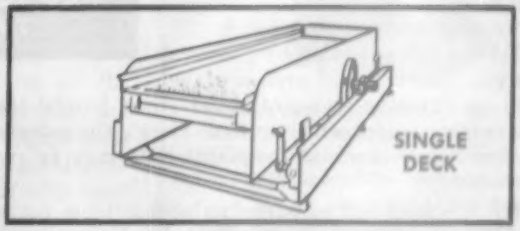

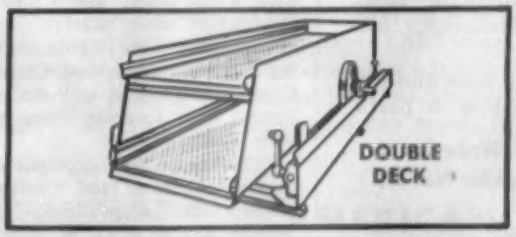

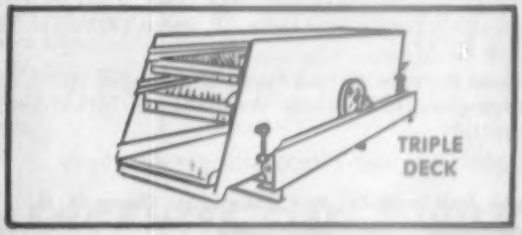

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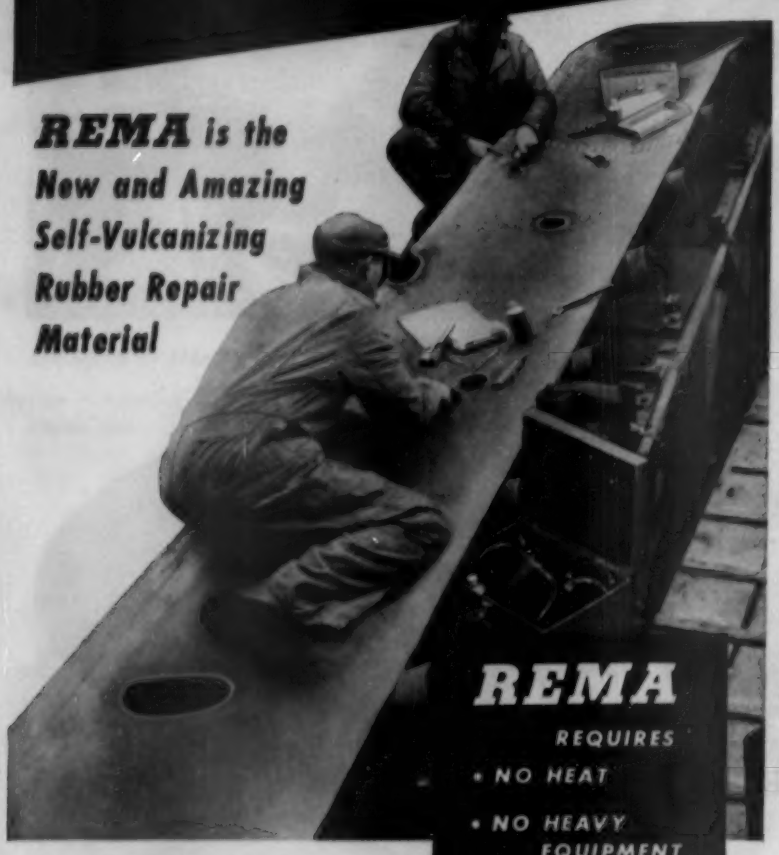
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▼ Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

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Write for Folder No. R4

Flexible Steel Lacing Co., 4684 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING RUBBER REPAIR MATERIALS

Labor Relations

(Continued from page 114)

Goold persisted in his proposal that Ryan be replaced with a union contractor and added that it would be 'advisable' for Climax to cease doing business with Ryan 'for a while.'

"The fence around most of the Climax property had but one main gate in the vicinity of the state highway. Employes not accommodated on the premises; i.e., many of Contractors' and about 10 percent of Climax's, were required to pass through this gate to work. The gate was manned by Climax guards who required either a badge or special permission for entrance.

"Pursuant to the vote at respondents' July 29 meeting, pickets appeared at the Climax gate at 6:00 A.M. on Friday, July 31, and picketed there throughout the day. Included among them were four employes of Intermountain Builders, who had been requested by Hod Carriers Agent Buscietta to leave their work and to act as pickets. Although the pickets carried signs with the legend, composed by Goold, that 'C. Ryan and Son and Eagle Lake Gas Co. were unfair to the Building Trades Council because they were paying substandard wages,' they did not seek permission to picket at Ryan's job sites inside the gate, nor did they picket two Ryan jobs on Climax property outside the fence where no employes, other than Ryan's, would be affected. Construction on the Climax projects was almost at a standstill that day because a sizeable number of Contractors' employes, who were members of respondent unions, refrained from working.

N.L.R.B.'s Argument

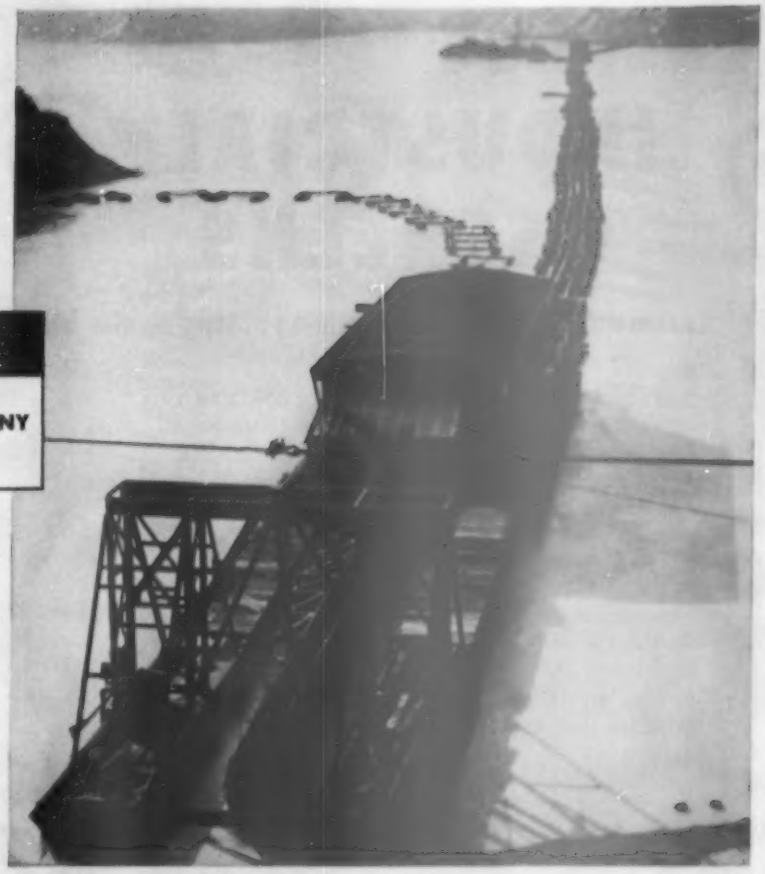
"The petitioner relies upon the following points: (1) The Board properly held that respondents' picketing at the Climax gate was 'secondary' activity within the proscription of Section 8(b) (4)(A) of the Act. A. Climax was neither the employer of Ryan's employes nor an 'ally' of Ryan, but was a neutral employer entitled to the protection of Section 8(b)(4)(A). B. Although respondents' dispute was with Ryan alone, and Climax and Contractors were neutral employers unconcerned in the dispute, the picketing was directed against Climax and Contractors, and it was designed to force Climax to cease doing business with Ryan.

"(2) The Board also properly found that respondents Hod Carriers and Ironworkers independently violated Section 8(b)(4)(A) by directly inducing their members in the employ of certain Contractors to go on strike

(Continued on page 120)

AMSCO PUMP APPLICATION FILE

at: THE STURM & DILLARD COMPANY
CIRCLEVILLE, OHIO



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"Working with Amsco Pumps has been very successful," reports George A. Fissell, Superintendent for Sturm & Dillard. "Compared to the dry digging method we used 20 years ago, it doesn't cost nearly as much, even with today's expensive labor."

Two Amsco Pumps serve this plant; the 20-year-old on the dredge is 2,000 feet from the plant and a 3-year-old on the booster is 1,200 feet from it. Their total lift is 30 feet. The Swintek ladder on the dredge works as deep as 60 feet when it's straight down, picking up a mixture of 35% sand and 65% gravel.

The shells of these Amsco Pumps are rebuilt with Amsco welding rod and Amsco shapes after a season of 1,500 hours, and replaced after the second season. Impellers also run a full season. Bearings on the 20-year-old pump were replaced just once, after ten years of service. Elbows and 45's in the pipeline are also Amsco fittings.

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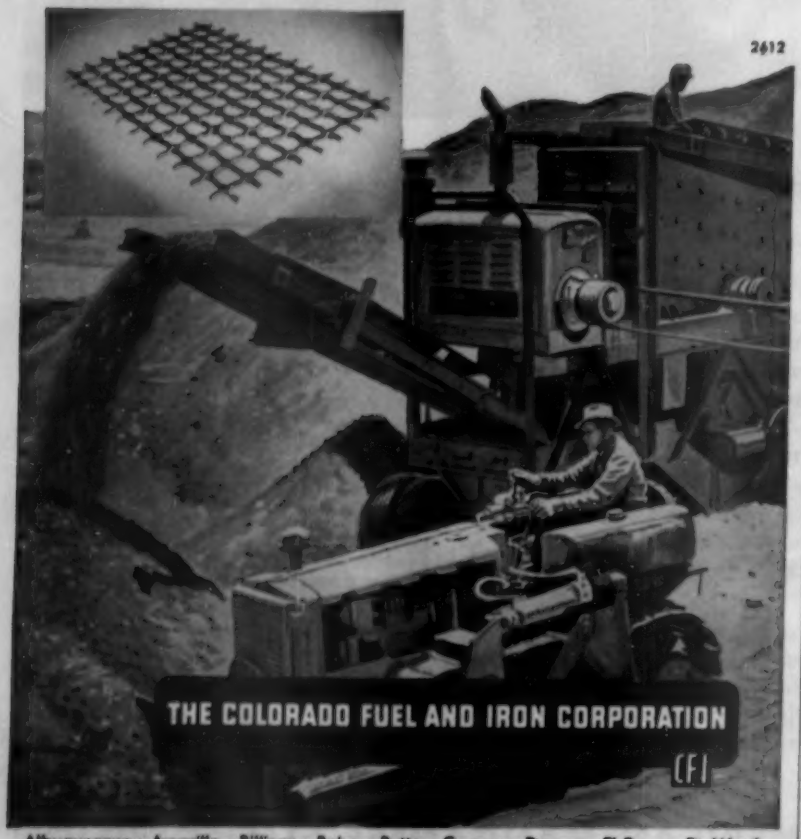
Less downtime and long service life from your vibrating screens add up to greater tonnage output at lower cost. You get these benefits from Cal-Wic Industrial Screens because they are made of tough steel . . . quality controlled for extra durability and sustained resistance to abrasion, vibration and fatigue.

Additionally, you'll find that the extensive sales engineering facilities of CF&I are further assurance of on-the-job efficiency. There's always a CF&I sales engineer within easy reach—ready at all times to give you prompt and helpful assistance with any operating problem that may arise.



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CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Montreal

for the same illegal object.

"Section 8(b)(4)(A) provides that it is an unfair labor practice of a union 'to engage in, or to induce or encourage the employes of any employer to * * * perform any services, where an object thereof is forcing or requiring * * * any employer or other person * * * to cease doing business with any other person.'

"Under this provision it is unlawful for a union to establish a secondary boycott by directing economic pressure such as picketing against a neutral employer; that is, one who is not a party to the underlying labor dispute and not able to promote the union's objectives in that dispute except by the indirect means of ceasing to do business with the primary employer.

"In National Labor Relations Board v. Denver Building & Construction Trades Council, 341 U.S. 675, the Supreme Court sustained the Board's finding that, by engaging in a strike an object of which was to force the general contractor on a construction project to terminate its contract with a subcontractor employing non-union labor on the project, respondent labor organization committed an unfair labor practice within the meaning of Section 8(b)(4)(A), supra.

Decision

"The issue in this case is whether or not Ryan was an independent contractor.

"Without attempting to review or analyze here the numerous authorities cited in the briefs for petitioner and respondents, it is apparent to this court that the relationship between Climax and Ryan was that of independent contractor; that there was no controversy between respondents and Climax or the Contractors other than Ryan; that the Board's finding that respondents' picketing was directed against Climax and the Contractors other than Ryan is fully supported by the record; and that the action of the respondents in attempting to force Climax to discontinue its contracts with Ryan, by picketing Climax and its Contractors other than Ryan and thus force the unionization of Ryan's employes, was in violation of Section 8(b)(A) of the Act.

"The order of the Board [to enforce 'no picketing' order] accordingly will be enforced."

Consolidated Rock Net Earnings

CONSOLIDATED ROCK PRODUCTS CO. has reported a record net profit for the second consecutive year. Sales for 1954 were lower at $22,121,049, against $22,505,671 for 1953, but net earnings increased to $1,590,024, during 1954, from $839,616 for 1953.

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No two plants are alike—design and equipment characteristics make the difference. That's why it's so important to consider *kind* and *size* when selecting a coal for your particular burning equipment. The B&O Technical Service is prepared to study your specific problem and help you choose the correct coal. Here's what our service does for you:

- outlines Bituminous coals available for your plant.
- discusses the merits of these coals.
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- determines the best coal for your system.
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Constantly doing things better!

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MARCY MILL
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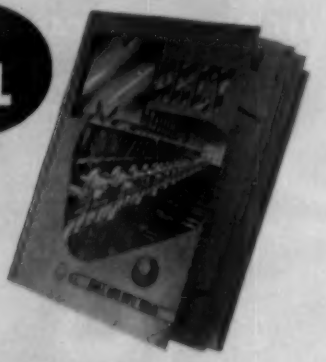

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KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

Slag for Soil

(Continued from page 86)

um to magnesium in high fertility soil. Improved method of testing soil for available calcium and magnesium.

(b) Minor element uptake by plants and residual values of secondary and minor element plant foods contained in water granulated blast furnace slag.

(c) Value of soluble silica input and consequent effect on uptake of phosphorus and increase in exchange capacity of soils. (Soluble silica apparently has benefits that are comparable to those found in an organic colloid.)

(d) Increase in the nutritional values of crops for human and animal consumption.

Agronomist Views

(Continued from page 89)

their yields and those of other crops harvested from the land, the larger the amount of agricultural limestone removed. If erosion is not controlled, some of the agricultural limestone will naturally wash away with the soil. Crops that cover the land most of the year will naturally reduce this leaching and erosion, thus giving a longer benefit from the limestone. Light or sandy soils will also lose lime faster by leaching than do heavy clay soils.

The most important way to bring about an increase in the use of limestone is to get it properly applied to soils that need it and give more people a chance to see and learn about the profit that can be made from the practice.

Illinois

"As an average over the state of Illinois, 46 percent of the soil samples tested by the University-supervised laboratories show a limestone requirement of 2 to 5 tons per acre. In many counties more than 60 percent of the samples were acid.

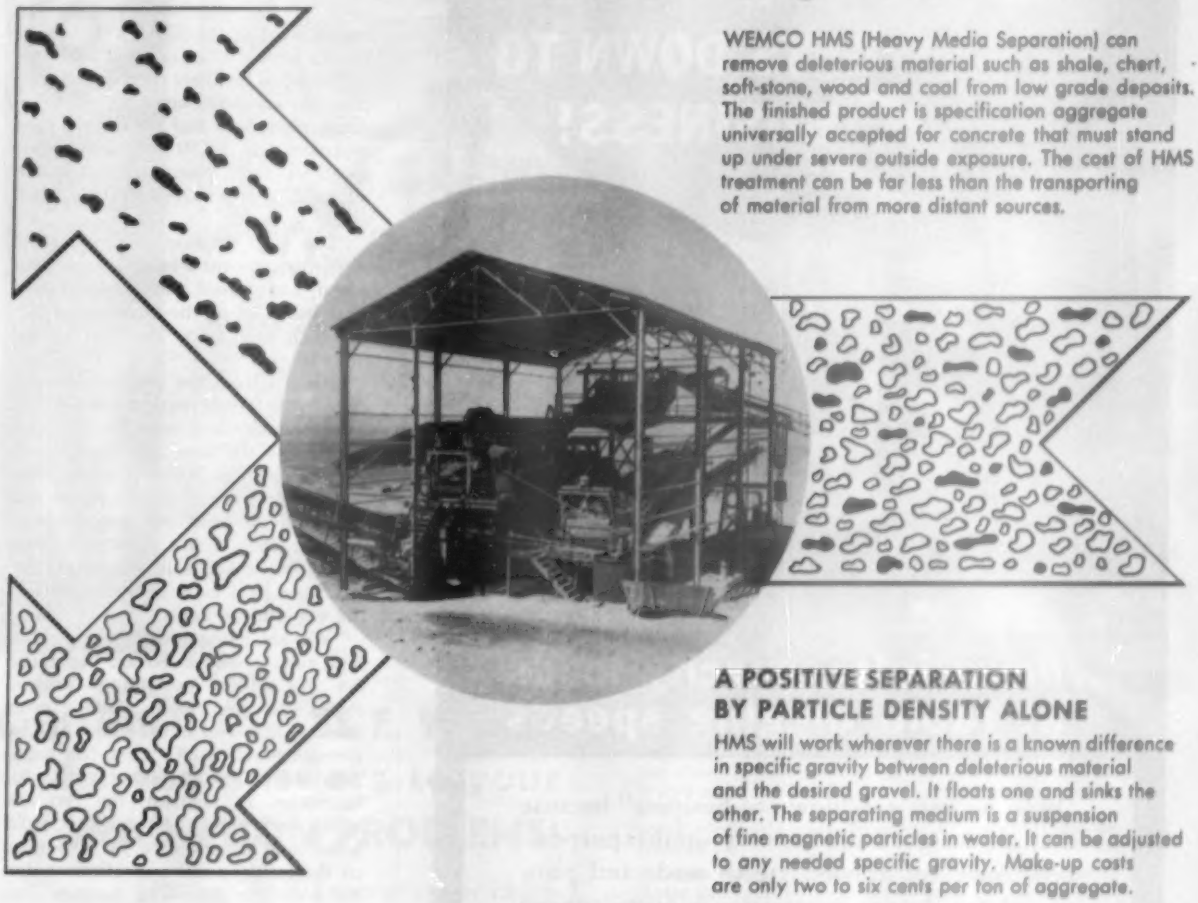
"The use of other fertilizer materials is increasing rapidly, in spite of the fact that without adequate liming their full effect cannot be realized.

"On most Illinois soils where limestone is deficient its use is much more profitable than the use of any other soil treatment material.

"The Brownstown experiment field located in Fayette County near Vandalia provides an excellent illustration of the relative effectiveness of limestone, phosphate potash and nitrogen. This field was started in 1940 on previously untreated silt loam. During its 14 years of operation six tons of limestone per acre (4 tons in the beginning and 2 tons in 1950) have been applied at a total per acre cost of $24.

"This $24 worth of limestone when

GET HIGH QUALITY AGGREGATE
from low grade sources



WEMCO HMS (Heavy Media Separation) can remove deleterious material such as shale, chert, soft-stone, wood and coal from low grade deposits. The finished product is specification aggregate universally accepted for concrete that must stand up under severe outside exposure. The cost of HMS treatment can be far less than the transporting of material from more distant sources.

A POSITIVE SEPARATION BY PARTICLE DENSITY ALONE

HMS will work wherever there is a known difference in specific gravity between deleterious material and the desired gravel. It floats one and sinks the other. The separating medium is a suspension of fine magnetic particles in water. It can be adjusted to any needed specific gravity. Make-up costs are only two to six cents per ton of aggregate.

WEMCO MOBIL-MILLS ARE YOUR INDUSTRY'S CHOICE

To date every HMS user in the sand and gravel industry has chosen the Wemco Mobil-Mill. It is a complete plant — pre-engineered — pre-fabricated — and of pre-determined cost. It is so thoroughly proven in design that it operates from the first day. It goes up in minimum time and at minimum cost. Then it knocks down and moves on when the deposit is exhausted. The Wemco HMS Mobil-Mill is available in capacities from 5 to 500 tons per hour.

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GETS DOWN TO BUSINESS!
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Owen buckets get "down to business" because they are designed and built for just that purpose. Low center of gravity...teeth made and positioned for deeper penetration...more rugged lip, shell and arm construction...full balanced digging power on each jaw of bowl...all these Owen features assure a maximum load at every bite.
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used alone (without other soil treatment) has resulted in crop yield increases valued at $180 or $7.50 for each dollar spent for liming. When limestone was used in addition to nitrogen, phosphate and potash the total value of the crop increases due to liming went up to $270, a return of $11.25 for each dollar spent for lime.

"Nitrogen fertilizer used in the presence of adequate amounts of limestone, phosphate and potash returned approximately $1.50 for each dollar spent. Similarly, phosphate and potash returned approximately $5 for each dollar invested.

"The crop rotation at Brownstown in this experiment was corn, soybeans, wheat and mixed hay. Crop values were based on on-the-farm prices during each year since the tests started in 1940.

"Results from the use of limestone during the 4-year period 1948-51 on 21 University soil experiment fields throughout the state are reported by C. M. Linsley in Illinois Circular 721. They show a return of $63.36 per ton of limestone used or approximately $15 for each dollar spent for limestone. No other soil treatment material has paid back so bountifully on the experiment fields.

"We are living today in an era of high sales pressure. So are our farmers. We seldom buy things. Instead things are 'sold' to us. Selling costs money, and we have tended to let limestone 'sell itself.' Very few salesmen are really out taking orders for limestone. In contrast, the fertilizer salesman is right there with his order blank and is getting a large portion of the farmer's soil improvement dollar while the limestone bargain goes begging for a buyer.

"Many of the large fertilizer companies are becoming concerned about this because of dwindling returns from the use of fertilizer and reduced ability of farmers to pay for it. I believe the time is here when someone should more actively take orders for limestone."—L. B. Miller, Agronomy Department, University of Illinois, Urbana, Ill.

New American Standards

AMERICAN STANDARDS ASSOCIATION has published the 1955 edition of "American Standards," listing and indexing about 1500 standards. The 48-page book contains standards for construction and civil engineering, mechanical, electrical, safety, chemical, metallurgy, gas-burning appliances, and mining, as well as a miscellany of other standards. The publication is available free of charge from the association at 70 East 45th St., New York 17, N. Y.

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HIGH-SPEED dewatering screens are designed, built and installed by McNally Pittsburg, and operating throughout the Western World.

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Whatever classifying equipment you operate . . . whether your tonnage is large or small . . . if your product is not measuring up to required specifications, the Charles E. Wood Company's consulting service can help you solve whatever gradation problem may be limiting your production.

If the "bulge in the middle" is your problem . . . if you're troubled by excess fines . . . if your minus 50 mesh is not being caught (or is caught and then gets away) . . . a diagnosis of your difficulty by Charles E. Wood Company Consultants may help to increase your production of *salable* tonnage.

And more salable tonnage is the *direct* way to more profitable operation!

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Installed around your conveyor, the RCA Electronic Metal Detector readily detects those villains that break off and eat up profits in downtime—manganese steel dipper teeth (which no magnet can dislodge), drill bits, tool steel parts.

PREVENTS TROUBLE—The Electronic Detector is on the job, every moment of the time, probing out tramp metal, both magnetic and non-magnetic. Wired to sound an alarm, spray-mark metal area, or stop a conveyor when trouble threatens, it prevents tough metal fragments from causing damage to the crushers later on.

No more burning out wedged tramp metal or replacing shafts damaged by stray metal parts. With the RCA Metal Detector in operation, these threats to production can be eliminated.

PAYS FOR ITSELF—By reducing downtime and production losses, and saving high-cost machinery replacements, the RCA Metal Detector protects profits and quickly pays for itself!

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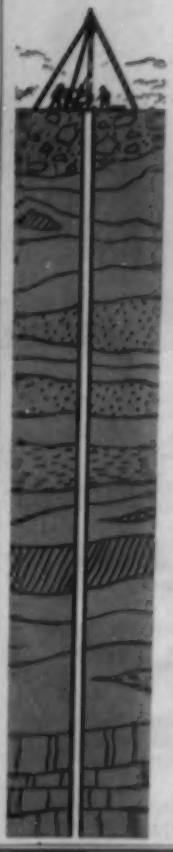

THAT'S OUR STORY in a nut shell and we're proving it every day—not only in our own world-wide contract core drilling operations, but also through the money-saving results being achieved by hundreds of other satisfied users.

After extensive comparative tests had demonstrated to our satisfaction that drill diamonds cut much faster and last much longer when "oriented" in the matrix with their hardest edge or "vector" toward the work, we decided that random setting was both inefficient and wasteful. Since then we have standardized on oriented diamond bits and have produced THOUSANDS — in a wide variety of types and sizes; with both cast- and powdered-metal matrices.

Only selected diamonds of suitable crystaline structure can be used and only specially trained and equipped setters of more than usual aptitude can be relied upon to orient diamonds correctly in the mold, but we are now fully organized for efficient production of ORIENTED DIAMOND BITS, at no additional cost to purchasers.

In terms of footage cost, we believe these to be the most economical diamond bits ever produced, and invite inquiries on that basis.

Bulletin 320 illustrates and describes all types and gives complete working data. Write for a free copy and tell us about your diamond drilling requirements. Our experienced executives welcome opportunities to make money-saving suggestions without charge or obligation.

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The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

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Buy WILFLEY for Cost-Saving Performance

WILFLEY centrifugal PUMPS

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

MANUFACTURERS NEWS

Research-Cottrell, Inc., New York, N. Y., manufacturer of electrical precipitation equipment, announces that Harry M. Pier has been

Harry M. Pier

Charles E. Beaver

appointed special assistant to the chairman of the board to study problems of air pollution and to coordinate activities of the company with those of industry, research and educational institutions and other organizations interested in this field. He was formerly general sales manager and will be succeeded by Charles E. Beaver, who has been assistant general sales manager since 1951.

Westinghouse Air Brake Co., Pittsburgh, Penn., announces that Richard H. Koehler has been appointed director of advertising and publicity. He was formerly advertising and sales promotion manager at the Le Roi division in Milwaukee, Wis., and succeeds Joe H. Serkowich, who has resigned to join a Chicago advertising agency. Prior to joining Le Roi two years ago, Mr. Koehler served for four years as advertising manager for Stearns Magnetic, Inc., Milwaukee. In his new position he will supervise and coordinate all advertising and public relations activities of the Westinghouse Air Brake Co., and its divisions and subsidiaries.

Richard H. Koehler

Raybestos-Manhattan, Inc., New York, N. Y., has appointed James Adams, Jr., as chief engineer of research and product design of the Manhattan rubber division. He has been with the company since 1939 and during that time has developed a number of new products including new types of conveyor belts, V-belts and transmission belts. The most recent is the new Poly-V drive which he invented.

Caterpillar Tractor Co., Peoria, Ill., has split its western division into the northwest division with J. A. Justeson as sales manager; and the southwest division with Ben L. Hagglund as manager of sales. W. E. McCoy has been appointed sales manager of the eastern division and Fred V. Jacobs has been made sales training manager. W. J. Farischon has been appointed supervisor of creative advertising; C. M. Adams, supervisor of domestic and export cooperative advertising; and Morrie Fearis, supervisor of shows and exhibits.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Euclid-Tennessee, Inc., Nashville, Tenn., as distributors in central Tennessee bounded on the west by the Tennessee River and on the east by and including the counties of Pickett, Overton, Putnam, White, Van Buren, Grundy and Franklin.

American Steel Dredge Co., Inc., Fort Wayne, Ind., has appointed the following distributors for the Wayne shovel and crane division: Dravo-Doyle Co., Pittsburgh, Penn., for western Pennsylvania and the panhandle of West Virginia; Cary Hall Machinery Co., Inc., Salem, Va., for the state of Virginia; Industrial & Farm Equipment Corp., Baltimore, Md., for

on the record...

SUSTAINED HIGH PRODUCTION

Here are five primary, factual reasons why B&W Type E Pulverizers are so widely used for direct-firing of rotary kilns . . . have established outstanding records of uniformly high performance in extended continuous service, reflected in maximum production . . . have consistently delivered full rated capacity year after year.

1. Grinding zone has no bearings or parts to be lubricated.
2. No internal adjustments are required.
3. Grinding elements are made of wear-resistant, long-life metals, with grinding balls held to close spherical tolerances.
4. Fully-enclosed reduction gear drive, with anti-friction bearings, has integral pump for automatic pressure lubrication.
5. Automatically rejects tramp iron and pyrites without damage to grinding elements or interruption of service.

Extensive, continuing B&W research findings plus the experience accumulated over many years of manufacture and application, are incorporated in the design and rugged construction of the B&W Type E Pulverizer . . . assure that it more than meets every requirement for efficient and economical firing in modern kiln-operating practice. The Babcock & Wilcox Company, Boiler Div., Process Equipment Dept., 161 East 42nd St., New York 17, N. Y.

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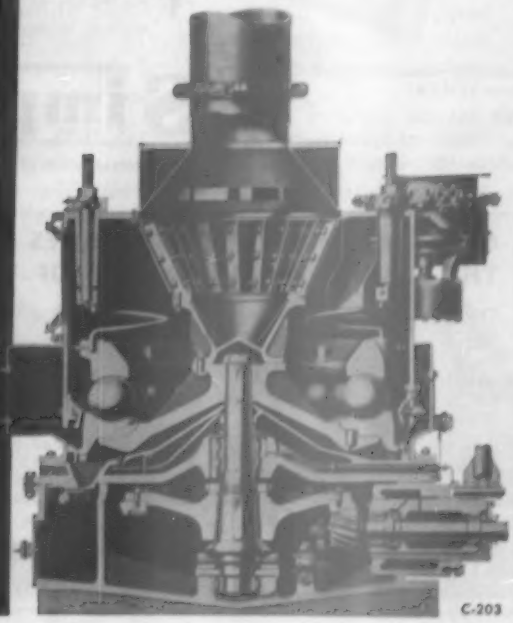

The ultimate in Kiln firing is obtained with a B&W Direct-Firing System using the B&W Type E Pulverizer.

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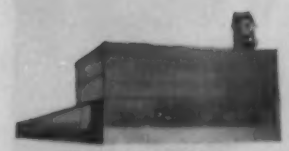
from SIMPLICITY'S HUGE warehouse stock



New SIMPLICITY Screen Plant

SIMPLICITY Woven Wire Screens in a wide range of wire gauges and openings are available for shipment from huge stocks in our warehouses within a few hours after receipt of your order. Edges formed and banded to fit any type of vibrator. Newly expanded production facilities permit fast action on special orders.

Bulletin No. 66

FOR COMPLETE DETAILS

Write today for Bulletin No. 66 describing the complete line of SIMPLICITY Woven Wire Screens. SIMPLICITY Screens are expertly woven and do a fast, accurate job of sizing and separating aggregates of all types. Good abrasion resistant qualities insure long life and dependable service with minimum downtime for repairs or replacement. Phone us for immediate shipment of your rush orders.

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the state of Maryland, Kent and Sussex counties of Delaware, and Washington, D. C.; and George P. Williams Co., Cleveland, Ohio, for northeastern Ohio.

The W. W. Sly Manufacturing Co., Cleveland, Ohio, manufacturers of dust and fume control equipment, has announced the appointment of David E. Neustadt as general sales manager. For the past three years he has been vice-president and general sales manager of Chas. Rivitz & Co., Cleveland. Prior to that he was West Coast district manager for the American Wheelabrator & Equipment Corp., Mishawaka, Ind., for the past eight years.

David E. Neustadt

Stephens-Adamson Mfg. Co., Aurora, Ill., has announced the election of A. D. Sinden as vice-president in charge of special engineering developments, and the appointment of D. W. Parkin as chief engineer. J. R. Steit has been named regional sales manager; H. S. McIntosh, assistant plant manager; and E. O. Weise, assistant chief engineer.

International Harvester Co., Chicago, Ill., has opened another district sales office in Jacksonville, Fla. The "general sales" office, which will handle the farm tractor, farm equipment and refrigeration business, will be under direction of J. P. O'Donnel, assisted by A. T. Ellis. The "motor truck" district sales office, which will handle only the motor truck end, will be managed by W. K. Perkins as district manager and R. G. Walls, assistant district manager.

Holland Machinery Co., Holland, Mich., announces the appointment of Lawrence M. Williams as sales and service representative for southwestern Michigan, Indiana, Illinois and Wisconsin. He was formerly in charge of production and engineering for Lith-I-Bar Co.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces that shareholders of the Baker Mfg. Co., Springfield, Ill., manufacturers of road building equipment, have approved the sale of all assets of the company to Allis-Chalmers in exchange for Allis-Chalmers common stock, and that operations have started at the Baker plants in Springfield and Beardstown, Ill.

Baldwin-Lima-Hamilton Corp., construction equipment div., Lima, Ohio, has appointed the Kentucky Equipment Co., Inc., Louisville, Ky., as distributor in the state of Kentucky with the exception of three extreme northern counties and three southeastern counties.

Marion Power Shovel Co., Marion, Ohio, has announced the appointment of D. E. Rizor as vice-president for sales and service to head the recently established consolidated sales and service department of Marion-Osgood-General.

Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis., has appointed Paul D. Sullivan as assistant sales manager, with headquarters in Milwaukee. He was formerly in charge of contractor sales in New York.

Babcock & Wilcox Co., New York, N. Y., has formed a new department in the boiler division to be known as the contract and erection department, with Laurence W. Hayward as manager. He was formerly assistant chief engineer of the division.

Clark Equipment Co., Benton Harbor, Mich., announces that some phases of production have started at its new 150,000 sq. ft. plant in Benton Harbor, Mich., which is being constructed for the manufacture of Michigan tractor shovels and excavator cranes.

(Continued on page 132)

Build Profitime . . . Cut Downtime

with Firestone NYLON Off-The-Highway Tires

THAT'S right! You increase yardage and profits and keep your downtime at a minimum with rugged Firestone Nylon Off-The-Highway Tires.

Whether it's earth moving, rock work or strip mining, Firestone can supply a rugged nylon tire specifically engineered for the job.

It costs you less to run on Firestone Nylon Tires because the treads give maximum traction and they are extra tough to resist cutting. The sidewalls are double thick to give added protection against cuts and snags. The new Firestone Safety-Tensioned Gum-Dipped* nylon cord body has four extra tread plies to insure longer tire life and more retreads. The Firestone Safety-Tensioned Gum-Dipped nylon body gives the greatest protection against impact breaks . . . flex breaks . . . heat failures . . . and water damage.

Let your Firestone Dealer or Store show you how Firestone Nylon Off-The-Highway Tires will cut your downtime and increase your profits.

*T.M. Reg. U.S. Pat. Off.

America's Future Progress Depends on Better and Safer Highways

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When you buy new equipment or replacement tires, specify FIRESTONE

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A TRAYLOR ALL STEEL JAW CRUSHER WITH time-tested, job-proved features

WILL SOLVE YOUR CRUSHING PROBLEM

A Traylor All Steel Jaw Crusher offers time-tested, job-proved advantages long preferred throughout the quarrying industry. Extra-heavy construction and exclusive design features combine to assure reduced down-time for maintenance, peak hourly production with fewer waste fines.

Original Traylor curved jaw plates assure a finer product in greater capacity through more efficient application of power. In fact, size for size Traylor jaw crushers require less power per ton of rock crushed than any other jaw crushers.

Traylor All Steel Jaw Crushers are available in a wide range of sizes with feed openings from 8" x 12" to 60" x 84". Send for free bulletin containing complete specifications and details.

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Welder is shown welding a "wear-sharp" repointer to the shank of a dipper tooth using the Amsco MF and flux.

HARDFACE WITH THE AMSCO® MF

for manual flexibility . . . plus machine speed and accuracy

The Amsco MF combines the visibility and craftsmanship of hand welding with the automatic advantages of machine work. Speed of hardfacing increases because the Amsco MF uses small-diameter electrode and high-current densities which allow the operator to maintain a high deposit rate. The electrode feed is continuous—and automatically regulated—to maintain a constant arc. Thus, the machine automatically *compensates* for operator movement or an irregular welding surface.

Cost of deposited metal is less! The Amsco MF uses coiled, bare mild steel electrode. It feeds through the flux hopper (the cone). There it is magnetically coated with your choice of manganese steel build-up or hardfacing alloy which is carried in the flux. You coat your electrode as you weld at considerable savings in deposit cost.

The machine is portable. It plugs into any standard welding unit, and requires no special setup. See a demonstration of the Amsco MF's speed, quality of weld and uniform deposit. Try it yourself and discover how easy it is to operate. Your Amsco Distributor is ready to show it to you now. Welding products are distributed in Canada by Canadian Liquid Air, Ltd.

make your Amsco Distributor HARDFACING HEADQUARTERS

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

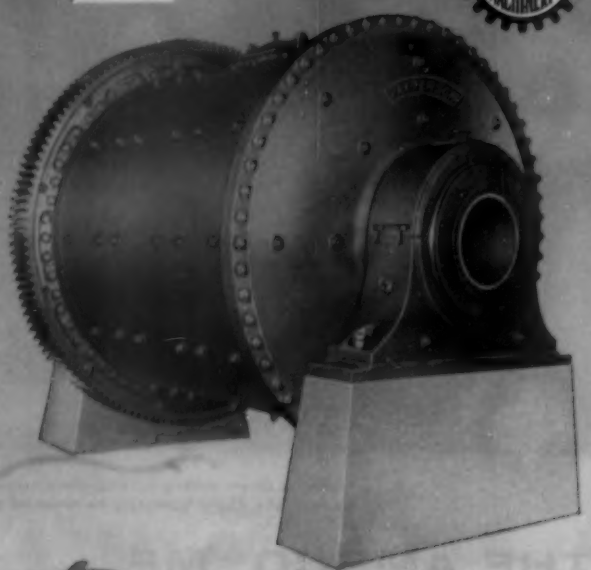
Chicago Heights, Ill.

HEAVY-DUTY GRINDING

from

Alumina to Zircon

MANUFACTURED BY PATTERSON MACHINERY



Patterson

BALL & TUBE MILLS

BUILT TO WITHSTAND THE MOST SEVERE PUNISHMENT IN SERVICE—Readily adaptable to fine or coarse grinding, wet or dry grinding, open or closed circuit grinding. Used successfully by the metal mining industry throughout the world.

Do you have a copy of our Catalog 534?

The Patterson Foundry and Machine Company

East Liverpool, Ohio, U. S. A.

NEW YORK, BOSTON, BALTIMORE, PHILADELPHIA, PITTSBURGH, DETROIT, CINCINNATI, ATLANTA, CHICAGO, ST. LOUIS, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE

The Patterson Foundry and Machine Company, (Canada) Limited

Toronto, Canada

McDowell Co., Inc., Cleveland, Ohio, has announced purchase of the entire assets and research facilities of the Sintering Machinery Corp., Neteong, N. J., manufacturer of the Dwight-Lloyd sintering machine. The new enterprise will be known as the Dwight-Lloyd division of McDowell Co. A. F. Leitner, formerly executive vice-president of Sintering Machinery Corp., has been elected a vice-president of McDowell Co. and will direct the Dwight-Lloyd division, with Harold E. Rowen as general manager.

Davison Chemical Co., Baltimore, Md., division of W. R. Grace & Co., announces that Charles W. Bowman has joined the research and development division and been assigned to the research engineering department at the Curtis Bay plant.

Traylor Engr. & Mfg. Co., Allentown, Penn., has announced the appointment of Steven Ekerovich as sales engineer. A graduate of the Columbia University School of Mines, Mr. Ekerovich has had 14 years of experience in the field of crushing, calcining and size reduction. He was sales engineer with Allis-Chalmers Mfg. Co. for 12 years.

Industrial Brownhoist Corp., Bay City, Mich., has announced the promotion of Warwick J. Hayes, Jr., from sales manager to vice-president in charge of sales, and E. W. Taylor, Jr., from chief engineer to vice-president in charge of engineering.

Worthington Corp., Harrison, N. J., has announced the appointment of George E. Bowdoin, former president of U. S. Hoffman Machinery Corp., as assistant to the president.

Hewitt-Robins, Inc., Stamford, Conn., announces that Martin Vander Laan has been appointed assistant to Elmer C. Salzman, manager of operations of the engineers division. He joined the company in 1934 as a junior draftsman and has worked in every phase of conveyor design and construction in this country and abroad.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed W. H. Marr Ltd., Kenora, Ont., Canada, as distributor for northwestern Ontario.

H. K. Porter Co., Inc., announces the appointment of R. B. Meltz as manager of the roll covering department of Quaker Rubber Corp.

Combustion Engineering, Inc., Chicago, Ill., announces that William B. Senseman has retired after 44 years with the Raymond division and will devote his entire time to the interests of the Pennsylvania Crusher Co. and the Johnson-March Corp.

Blaw-Knox Co., Pittsburgh, Penn., has announced an expansion and modernization program which will consolidate manufacture of road-building equipment at Mattoon, Ill.; concentrate manufacture of process equipment at the Buflovac equipment division, Buffalo, N.Y.; improve facilities at Blawnox, Penn., and centralize research and development functions.

Caterpillar Tractor Co., Peoria, Ill., has appointed Merle W. Dargel as assistant service manager. He was formerly eastern service manager and will be succeeded by Bruce T. Smith, who has been serving as assistant central service manager.

The Dow Chemical Co., Midland, Mich., has promoted Max Key to manager of the plastics production department to replace Dr. William H. Schuette who was recently made assistant to the general manager of the Midland division.

Euclid Division, General Motors Corp., Cleveland, Ohio, has appointed the Llewellyn Machinery Corp., Miami, Fla., as distributor for southern Florida. Other distributors include Conley-Lott Machinery Co., Lubbock, Texas; Contractors Machinery Co., Detroit, Mich.;

Put your Shipping Sack on your Sales Team

... with attractively designed brands and brilliant multi-color printing by HAMMOND

Outstanding in appearance and durability . . . Hammond Multi-Wall bags create enthusiasm and pride among your sales representatives . . . help to increase sales through distributors and dealers . . . build prestige for your company and products, and provide complete protection of contents from packing machines to the ultimate consumer. Yes, you can put your shipping sack on your sales team by specifying Hammond Multi-Walls.

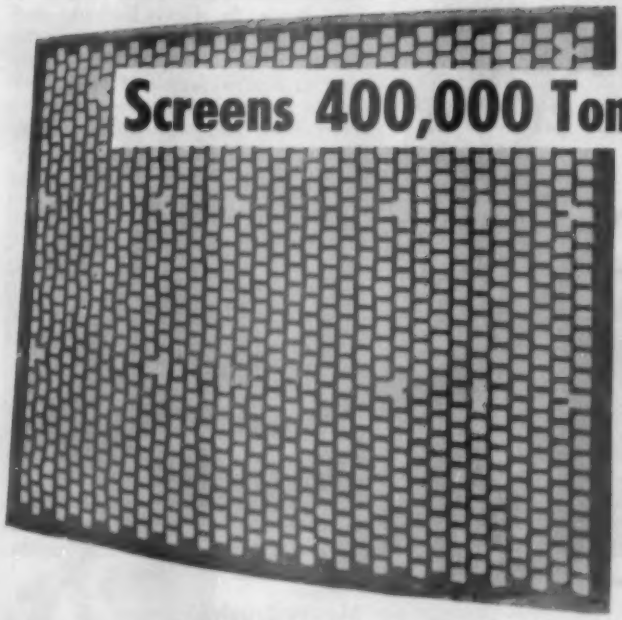
For Multi-Wall Bags, "Make it a Habit to Depend on Hammond"

HAMMOND Betterbags

"TREES ARE A CROP"

Hammond Multi-Walls

HAMMOND BAG & PAPER COMPANY
General Offices: Wellsburg, W.Va.
Plants in Wellsburg, W.Va., Pine Bluff, Ark., and Charlotte, N.C.
Representatives in the following cities: NEW YORK, N. Y., CHICAGO, ILL., MINNEAPOLIS, MINN., KANSAS CITY, MO., CLEVELAND, OHIO, ATLANTA, GA., WASHINGTON, D.C., DALLAS, TEXAS, CHARLOTTE, N. C., LIGONIER, PA., BLUEFIELD, VA.



Screens 400,000 Tons of Petersburg Granite without a Mishap!

Here's another success story that typifies Hendrick's ability to manufacture Perforated Metal Screens that take the beatings of constant heavy-duty usage yet afford long service life:

PROBLEM: *One of the Virginia quarries of Sunnyside Granite Co. had trouble screening hard "Petersburg Granite." The granite was so abrasive ordinary screens wore out quickly and had to be replaced.*

SOLUTION: *Hendrick manufactured a screen of ½" thick steel perforated with 1½" square holes. The screen was then heat-treated and double corrugated.*

RESULT: *Over 400,000 tons of Petersburg Granite passed over this one screen before it had to be replaced.*

Hendrick Perforated Plate used on vibrating and shaking screens can often mean the difference between profit and loss. To see how you can best benefit from Hendrick's long experience in manufacturing screens for the quarry industry, call your nearby representative today.

SEE OUR CATALOG IN SWEET'S

Hendrick
MANUFACTURING COMPANY
47 DUNDAFF STREET, CARBONDALE, PA.
Sales Offices in Principal Cities

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Wedge Wire • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

UNIVERSAL

THE BEST IN SCREENING

AT THE LOWEST PRICE

THE MOST MODERN AND EFFICIENT ELECTRIC HEATING EQUIPMENT AT A REASONABLE PRICE

- VIBRATING SCREENS- *All sizes and types*
- UNILEC HEATING EQUIPMENT
- UNIFLEX VIBRATORS
- UNIVIBE RIDDLES

WRITE FOR CATALOG NO. 130

UNIVERSAL VIBRATING SCREEN CO.
Racine, Wisconsin
Quality Screens Since 1919

Hubbard & Floyd, Inc., New York, N. Y.; **Hall-Perry Machinery**, Butte, Mont.; **Foulger Equipment Co.**, Salt Lake City; and **G. H. Godsall Equipment, Ltd.**, Toronto, Canada.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces that W. A. Roberts, president, died suddenly on April 12 at the age of 57. He had been associated with the company since 1924, starting as a salesman for the tractor branch in Wichita, Kan. Two years later he was transferred to Canada as sales representative. Mr. Roberts went to Milwaukee in 1930 as agricultural sales manager of the tractor division and the following year was advanced to general sales manager. He became vice-president in 1944, was elevated to executive vice-president in 1947, and one year later became a director and member of the executive committee. He had been president of Allis-Chalmers since 1951.

Worthington Corp., Harrison, N. J., has appointed Clarence S. Wentworth as central region sales manager to succeed William A. Meiter who has been promoted to general sales manager. Mr. Wentworth was formerly manager of the Detroit district office.

GMC Truck & Coach Div., General Motors Corp., Pontiac, Mich., has established a new fleet division for truck sales headed by A. S. McEvoy, formerly assistant sales manager of the coach division. Other managers of the fleet division are: A. A. Shantz, assistant manager; W. L. VandeWater, sales manager; E. T. Herbig, sales promotion manager, and A. L. Wallace, government sales manager.

Mexico Refractories Co., Mexico, Mo., has announced purchase of assets of the Niles Fire Brick Co., Niles, Ohio, which has an annual production capacity of more than 25 million silica and fire clay brick. Property holdings in Ohio, Pennsylvania and Kentucky were included in the sale.

Indiana Meeting

(Continued from page 66)

hower's highway program and Sen. Gore's proposed bill. Mr. Walker said that in 10 years it is expected that 81 million vehicles will be using the highways. He said that today only 700 ft. of highway would be available for each vehicle if they were all using the highways at the same time. Mr. Walker said that President Eisenhower's highway program will take a 6-cent gas tax to finance it. He pointed out that motorists today are spending more money for insurance than they are for highways.

Albert J. Wedeking, executive secretary, Indiana Toll Road Commission, gave a progress report on toll road construction. The commission has awarded contracts for 136 miles of the highway across northern Indiana, and it is expected rapid progress will be made toward completion of this route in 1956. The north-south toll road eventually will be built to the Ohio River near Louisville, Ky. Due to the controversy which developed over the location of the route around Indianapolis, a new route west of the city is being studied as an alternative to the originally planned location east of the city.

The convention closed with a social hour preceding the annual banquet. A very excellent colored moving picture was shown by Geo. Enfield, staff agronomist, Purdue University, who recently returned after a long assignment in Jordan, Iran and other mideastern countries. He gave some very entertaining accounts of his experiences in the Middle East, and described some of the customs of the countries.

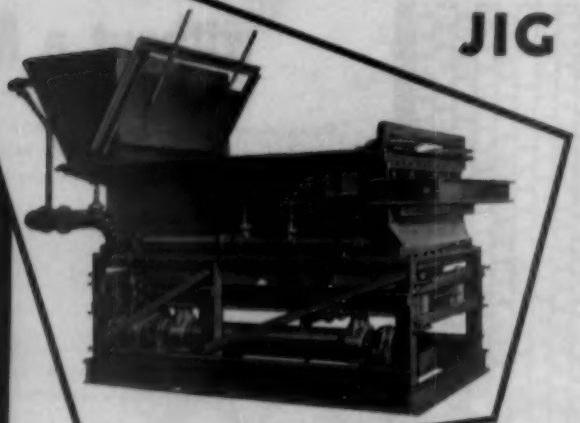
Glossary of Geologic Terms

DEFINITIONS OF APPROXIMATELY 2600 GEOLOGIC TERMS used by geologists, engineers, and professional men in allied fields, are given in the "Glossary of Selected Geologic Terms," by William Lee Stokes and D. J. Varnes, which will be published as Vol. 16 of the Proceedings of the Colorado Scientific Society. The book is available at prepublication prices of $2.50 cloth bound and $2.00 paper bound. Orders are being accepted until May 15, from Treasurer, Colorado Scientific Society, Box 688, Denver, Colo.

Moves Crushed Stone Operations

MARIN ROCK AND ASPHALT CO. has moved its crushed stone, gravel and asphalt processing facilities from Point Reyes to the side of Burdell Mountain, located on the Bodkin Ranch, near Novato, Calif. The total cost of the project is about $500,000.

THE MECKUM SAND AND GRAVEL JIG



REMOVES
WOOD
LIGNITE
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SHALE
POROUS STONE
SOFT STONE
COAL
CHERT
CLAY

Improve your sand or gravel specifications at a low cost per ton. Of compact design, the Meckum Jig separates low from high specific gravity materials with a positive water and mechanical action.

Write us for details or nearest installation.

MECKUM ENGINEERING, INC.
53 W. Jackson Blvd., Chicago 4, Ill. Dayton Road, Ottawa, Ill.

EHRSAM

designers manufacturers

Modern gypsum plaster & wallboard equipment

To the plaster and wallboard industry, the selection of Ehrsam equipment for use in the outstanding new plant of the Blue Diamond Company has a special meaning. It shows that Ehrsam, a pioneer in this industry's equipment field, continues to hold a place of leadership in the design and manufacture of the most advanced and highly productive types of processing, conveying and finishing machinery. Whether you are planning a complete new plant, a modernization program, or a simple replacement, it will pay you to check your needs with Ehrsam.

calcining kettles
wet pin mixers
lath punches
transfer sections

grinding equipment
conveying systems
forming rolls
cut off knives

THE J. B. EHRSAM & SONS MFG. CO. ENTERPRISE, KANSAS

Furnishes a positive seal for round flexible joints. Used by leading dredging and hydraulic sand-and-gravel operators, and the U. S. Engineering Corps. This Multi-use chain sleeve clamp is easy to apply . . . positive in action. Write for illustrated folder, today.

THE BLACK BROTHERS CO., INC., 505 9th Ave., Menasha, Illinois

"CROSS" PERFORATED STEEL
SEGMENTS, SECTIONS, DECKS AND PARTS

for VIBRATING
REVOLVING
SHAKING
and other types of
Machinery, Equipment
and Facilities

CROSS HEXCREEN
for Uniform Sizing and Maximum Capacity

SQUARE OPENINGS
for Intermediate Capacity

ROUND OPENINGS
for Uniform Sizing

CROSS
Special Analysis Steels
Plus CROSS ENGINEERING
CROSS WORKMANSHIP
equals maximum production
at MINIMUM COST!

The Sign of PLUS QUALITY
for PLUS PERFORMANCE

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Increased* CEMENT PRODUCTION

BRADLEY HERCULES MILLS

The quickest, most economical way to increase your grinding capacity

For the cement manufacturer with excess kiln capacity . . . here is the answer to INCREASED CAPACITIES at an appreciable SAVING IN HORSEPOWER. The Bradley Hercules Mill, used as a preliminary pulverizer before compartment mills or tube mills, results in INCREASED PRODUCTION of finished material at a LOWER COST per barrel.

Rugged, dustless construction, maximum accessibility keep maintenance costs at an absolute minimum.

Automatic electrical feed control eliminates manual operation.

For complete information, write for Catalog No. 57

Bradley PULVERIZER CO.

LONDON ALLENTOWN, PENNA. BOSTON

Rebuilding Jaw Crusher Plates

We do NOT recommend this job for the crushing plant maintenance welder, as proper rebuilding requires the use of special jigs and other expensive equipment. Why not call in our field man for a check-up on those used plates in your scrap pile?

with MANGA-TONE N.M. more than doubles life of original plates.

For many years, attempts to build corrugations worn off crusher plates were unsatisfactory. Welding time and materials cost made the practice unprofitable.

With the advent of Two-Tone Welding and our MANGA-TONE N.M. the rebuilding of crusher plates is now an established practice. Experience of plants using our rebuilt crusher plates over a period of 3 or more years, indicates that a plate rebuilt with MANGA-TONE N.M. will give from 30% to 50% greater performance than did the plate when new.

Your RESISTO-LOY distributor, through the Two-Tone Shop, can rebuild your plates for a figure substantially less than the cost of new ones. Photograph shows a stack of rebuilt plates in one of our shops.

RESISTO-LOY CO., INC., Grand Rapids 7, Michigan

CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Aerial view of Pinellas Industries ready-mix, block and pipe plant at St. Petersburg, Fla.

GOOD APPEARANCE BUILDS SALES and Duraplastic-made products like these at Pre-Cast Concrete Products, Inc., Chicago Heights, Ill., feature rich texture and clean, true edges for customer appeal.

PRODUCTS MANUFACTURERS REPORT:

Richer face texture . . . cleaner edges . . . fewer rejects with DURAPLASTIC*

MIXES MADE WITH ATLAS DURAPLASTIC CEMENT feed easily through this block machine at Pre-Cast Concrete Products, Inc. Less breakage and fewer culls mean lower production costs . . . higher profits for manufacturers.

OFFICES: Albany • Birmingham • Boston • Chicago • Dayton • Kansas City Minneapolis • New York • Philadelphia • Pittsburgh • St. Louis • Waco

Here's how Duraplastic cement trims production costs and improves product appearance . . . helps you make and sell more concrete products at greater profits

It's *easier* to sell cleanly formed concrete products made with Atlas Duraplastic Air-Entraining Portland Cement. Smooth, cohesive Duraplastic-made mixes give products sales-promoting good appearance — clean, true edges, plus richer face texture. And products made with Duraplastic Cement offer high resistance to passage of water, another important sales point in your favor.

Atlas Duraplastic Cement means greater economy, too. Mixes are "rubbery" and hold together better. This means fewer culls and throwbacks . . . less breakage in handling of green products . . . reduced production costs and greater profits for you.

You'll produce better block and other products with Atlas Duraplastic Cement. Mixes made with it feed easily through the machine . . . help increase production.

YET DURAPLASTIC COSTS NO MORE than regular cement! Requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. Write for descriptive booklet. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

"Thrifty" says: Atlas Duraplastic Cement cuts costs and boosts profits by decreasing breakage and reducing the number of costly culls and throwbacks.
"Nifty" says: Sales and good appearance go hand in hand. Customers go for the clean, true edges and richer texture of Duraplastic-made products.
*"Duraplastic" is the registered trade-mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.
ATLAS®
DURAPLASTIC
AIR-ENTRAINING PORTLAND CEMENT
CP-D-170
A UNIVERSAL ATLAS PRODUCT

Makes Superior Concrete Products at No Extra Cost

UNITED STATES STEEL HOUR—Televised alternate weeks—See your newspaper for time and station

INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S COVER is an aerial view of the combined ready-mixed concrete, block, and pipe plant of Pinellas Industries, St. Petersburg, Fla. Aggregate, unloaded from railroad cars, is elevated by the long, inclined conveyor and discharged, via shuttle belt conveyor into any of four stockpiles. A tunnel belt conveyor withdraws the material from the stockpiles and discharges onto an inclined belt serving the ready-mix plants to the left of the railroad spur. A short belt conveyor carries material from the turnhead spout, across the tracks to the pipe plant.

Texas Industries Growth

TEXAS INDUSTRIES, INC., Dallas, Texas, has grown from two plants with annual sales of $217,000 five years ago, to a network of 30 closely knit plants in three states with annual sales of more than $9.6 million. A leading producer of lightweight expanded clay or shale aggregate, the corporation produces over half of the lightweight concrete products and lightweight aggregate manufactured in the Southwest. Ralph B. Rogers is president of the firm.

Adds Pre-Mixed Concrete

LEE LIME CORP., Lee, Mass., has added a "do-it-yourself" pre-mixed concrete, designated "Handi-Mix," to its line of products. The mixes are produced in three types: a sand mix, for flag stone, cementing, sidewalk repair and other patching work; mortar mix, for plaster repairs or the building of fireplaces and chimneys; and gravel mix, for building sidewalks, steps, floors, curbs, etc. The mixes are put up in 20, 40 and 80-lb. bags. A mixing plant was recently built, at a cost of about $150,000, to handle production of the new product. Peter Comalli is general superintendent.

Prefab Swimming Pool

THE MARIETTA CONCRETE CORP., Marietta, Ohio, is manufacturing prefabricated concrete walls for "do-it-yourself" type swimming pools. A 45-x 105-ft. pool was built in West Alexandria, Ohio, for approximately $25,000, and residents of Sisterville, Ohio, are considering building one there.

Adds Prestressed Products

BEN C. GERWICK, JR., president of a marine and foundation construction company in San Francisco, Calif., has announced plans to manufacture prestressed concrete products at the Petaluma, Calif., plant. The products, including beams, girders, columns, piles, slabs, etc., will be shipped by barge, truck and rail.

Pumice Block Plant

CAL-LITE CORP. has opened a new plant at Fontana, Calif., for the production of pumice block. Initial output is 1000 block per hour, but will be increased to about 6000 per hour upon completion of installation of the additional units. Cost of the plant was approximately $250,000. Gene Brock is plant manager.

Sand and gravel barges, delivered to the Dravo Corp., Keystone Div. plant at Rochester, Penn., by towboat, are unloaded by whirley crane into bins and ground storage

TRANSIT MIXED CONCRETE CO., Pasadena, Calif., has opened a concrete batching plant at Sun Valley, Calif., replacing a former installation there. The plant has a capacity of 70 cu. yd. per hr., and was designed to meet the growing demand for ready-mixed concrete in the San Fernando Valley. L. Glenn Switzer is president, and Jack Hunter is manager of operations at Sun Valley.

NORTH HOLLYWOOD CONCRETE TILE CO., has announced plans for expansion of its plant at North Hollywood, Calif., to meet an expected 50 percent increase in sales over 1954. New equipment being installed includes an additional concrete block machine, a 200-ton batching plant, a 10-tunnel curing kiln, and a lift truck.

SITTON SEPTIC TANK CO. is building a plant at Springfield, Ohio, for the manufacture of precast concrete septic tanks and allied products. An office building is also being built. John R. Tiffany is president of the firm.

NATIONAL CEMENT PRODUCTS CO., Toledo, Ohio, has been awarded a Zonatile manufacturing franchise, and will distribute precast, insulating concrete roof decking in the Michigan and western Ohio areas. C. B. Fellabaum is president of the company.

NEW YORK COAL SALES CO., Basic Construction Materials Div., has announced plans for a ready-mixed concrete plant at Ironton, Ohio. Various plant sites are being considered, according to Robert Patton, executive vice-president.

PAULSEN BUILDING AND SUPPLY CO., Cozad, Neb., has purchased the Easter Construction Co. at Holdredge, Neb., and is continuing ready-mixed concrete operations at the plant.

JENNINGS READY MIX CO. has been established at Jennings, La., by F. L. Poole and R. D. Moore. Plant equipment includes a crane, concrete batching plant, and a fleet of transit mixer trucks.

PIPKORN FUEL AND SUPPLY CO., Oshkosh, Wis., has added ready-mixed concrete to its line, with the addition of a batching plant and five transit mixer trucks.

TRI-CITY CONCRETE CO. has opened a ready-mixed concrete plant at Tarkio, Mo. Two transit-mixer trucks are operated from the plant. Art Geist is the plant manager.

PRESTRESSED CONCRETE CO. was recently organized at Salt Lake City, Utah, for the manufacture of prestressed, pre-tensioned concrete building products. The company was formed as a division of Utah Sand and Gravel Co.

Dumptor hauls along trestles .

. . or tunnels

without turning

Shuttling back and forth between the loading unit and dump area, Koehring Dumptor travels round-trip without turning. It operates with equal ease in both directions on overhead trestles, in confined underground mines, on open-pit ledges and narrow haul roads. Dumptor gets this unique no-turn advantage through a constant-mesh transmission that gives the same 3-speed travel in either direction.

Every turn eliminated cuts 15 seconds off cycle time. This adds up to a substantial increase in yards hauled per hour. For example, by saving only 2 turns, time studies prove that Dumptor increases hourly yardage output more than 10% on an average 1,000-foot haul.

One-second gravity-dumping also maintains a high rate of production. To dump, operator trips body-release lever, and the 6-yard body instantly tilts 70°. One second later the load is out, and Dumptor is on its way back for the next load. There's no 15 to 25-second wait for slow-acting hydraulic or electric body hoists. What's more, gravity-dump never balks, never wears out.

To learn what these Dumptor advantages can mean in increased production and lower hauling costs on your work, call your Koehring distributor, or write for Dumptor® catalog.

KOEHRING COMPANY

Milwaukee 16, Wisconsin

CK440 *Subsidiaries:* PARSONS • KWIK-MIX • JOHNSON

"Repeater" automatically re-batches any mix selection

At the turn of a dial and push of a button, this Johnson commercial transit-mix plant produces any one of 120 different size and type batches of aggregates and cement. It weighs out any combination of materials you select on the central dial-scale control panel . . . and automatically repeats any batch selections for a pre-determined number of times.

The electric-control, 120-mix-selector panel provides for concrete of various strengths in any combination of materials, in ½ to 2 cubic yard batches. For each size batch there are individual selections for 3 to 6-inch slumps. Dial system makes it easy to change from one mix selection to another. To get any size or type of batch, operator merely turns the selector dial, sets the "repeater", pushes the "start" button . . . and the plant weighs out fast, with pinpoint accuracy. During the batching cycle, a lock prevents accidental change of the mix selector.

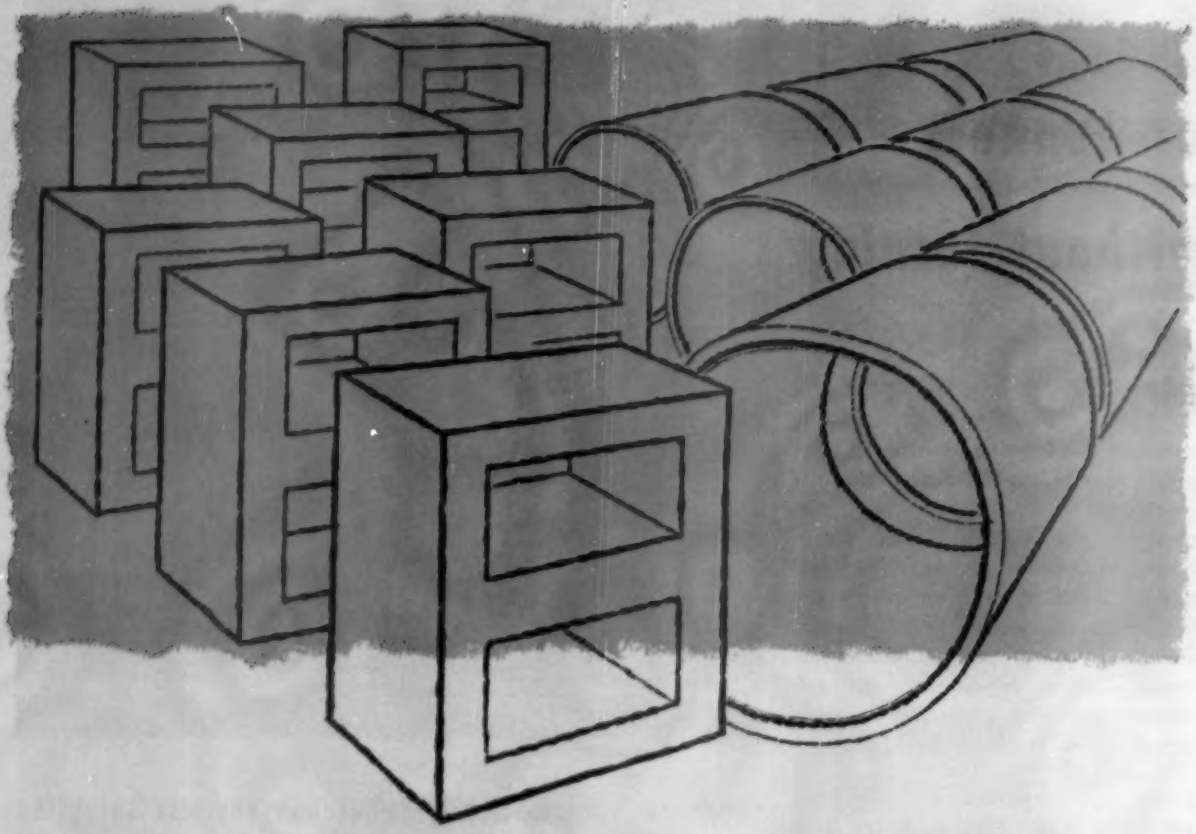
Nine material weigh-dials on the control panel have individual pen-recorders. Exact weight of each batch is automatically graph-recorded. Johnson batching equipment consists of: six 5000-lb. aggregate batchers (two with automatic moisture-compensators) . . . a 3000-lb. cement batcher with dual fill valves for selecting 2 types of cement . . . a 2000-lb. water weigh-batcher, and a 5-lb. (80-oz.) air entraining admix batcher. All are fully automatic.

Whenever you plan a new plant . . . or want to modernize an existing set-up, look into the increased efficiency you can get with Johnson equipment. You'll find your Johnson distributor is at your service . . . ready to help at any time.

20

JOHNSON C. S. JOHNSON CO. CHAMPAIGN ILLINOIS

Koehring Subsidiary



Increase output and quality

of concrete products with low-cost D-40

Let us show you how D-40 has helped other concrete products manufacturers make superior products, with a reduction in rejects, and at the same time increase production.

Economical D-40 plasticizes the "mix" to flow easier and more quickly into molds—filling out the corners and resulting in more perfect products. An added advantage is the reduction of abrasive wear on mixing and molding equipment.

Dry, granular detergent D-40 is easily added to the "mix" at the ratio of one to two oz. per bag of cement. Our experience is at your disposal. Contact any Oronite office for free sample of D-40 or ask for an Oronite detergent specialist to contact you.

ORONITE CHEMICAL COMPANY

ORONITE CHEMICAL COMPANY

200 Bush St., San Francisco 20, Calif. • 714 W. Olympic Blvd., Los Angeles 15, Calif.
30 Rockefeller Plaza, New York 20, N. Y. • 20 North Wacker Drive, Chicago 6, Ill.
Mercantile Securities Building, Dallas 1, Texas • Carew Tower, Cincinnati 2, Ohio

More ready-mixed concrete is sold in JAEGER truck mixers than by any other method

142 CU. YDS. BETWEEN 7 AND 10:30 A.M. DAILY: On their housing project at San Jose, Calif., Eichler Homes, Inc. scheduled each day to start with the pouring of foundations and floor slabs. Average daily requirement was 142 cu. yds. By starting seven Jaeger 4½ yd. "Mix Plus" truck mixers at 7 o'clock, San Jose Transit-Mix Concrete completed each day's pour by not later than 10:30 in the morning.

More ready-mixed concrete is sold in Jaeger truck mixers than by any other method. Ask your Jaeger distributor to show you why—or write for complete information.

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

FRONT END LOADERS • COMPRESSORS • PUMPS • CONCRETE MIXERS • PAVING MACHINES

Another BESSER Booster*

★ This is the 110th of a series of ads featuring leaders in the Concrete Products industry who are stepping up block production with Besser Vibrapac machines.

Joe Chalupa Jr. and Walter Milner, officials of the Standard Building Material Company, South St. Paul, Minn.

Company yard office built with VIBRAPAC block.

Old Time Block Maker Prefers VIBRAPAC for High Production

When Standard Building Material Co., South St. Paul, Minnesota, required a high production block machine, they naturally specified the Besser VIBRAPAC.

Block producers since 1916, the company learned from experience that only if a machine can be kept running day after day, week after week *without downtime,* can block costs be reduced to a minimum. The Besser VIBRAPAC meets that requirement. In the words of Joe Chalupa, Jr., general manager, *"We feel the Besser machine is the best obtainable."*

Now operating at full capacity, the Standard Building Material Company is known throughout the Twin City area for its high quality block. About 50% is used for home construction. In addition to producing block, the company operates its own gravel plant.

Ask a Besser Representative for Vibrapac literature.

VIBRAPAC, Front Pallet Feed Model, installed in the Standard Building Material Company plant. This high production machine produces up to 10,000 high quality block (8" or equivalent), daily.

BESSER COMPANY
Box 135, Alpena, Michigan, U. S. A.
Complete Equipment for Concrete Block Plants

Yard scene at this South St. Paul plant. Note long conveyor belt for elevating aggregate to bins above mixer.

BESSER

World's Leading Manufacturer of Concrete Block Machinery

WE SHORTENED IT

FOR BETTER WEIGHT DISTRIBUTION

BLAW-KNOX *Hi-Boy* TRUKMIXERS

haul *more legal pay load* on shorter wheelbase trucks

● These Blaw-Knox 4½, 5½ and 6½ cu. yd. Hi-Boys are *guaranteed to mix half a yard over the normal rated capacities,* in accordance with TMMB standards! Think what that means to your profit tally when you divide the total pay-load per day by the number of trips!

It's one result of exclusive Blaw-Knox design. Locating the engine at the left rear permits moving the mixer forward on the truck to utilize more of the legal load allowance of the front axle. The pedestal and flush water tank are combined to reduce weight by approximately half a ton, and lower the center of gravity of the loaded mixer. Transmission and engine located at the side assure maintenance convenience and easy access. There are dozens of practical, profitable features you'll want to investigate. Call your Blaw-Knox distributor today.

BLAW-KNOX COMPANY

Construction Equipment Division
Pittsburgh 38, Pa.
Offices in Principal Cities

Ask about the
BLAW-KNOX
Complete Ready-Mix Package

EVERYTHING YOU NEED FOR MORE PROFITABLE READY-MIXED CONCRETE OPERATIONS

Get all your ready-mix equipment from one source to lick maintenance and parts supply bottlenecks! The Blaw-Knox "Complete Ready-Mix Package" includes Truck Mixer Loading Plants, Hi-Boy Trukmixers, Aggregate and Cement Batching Plants Clamshell and Concrete Buckets . . . all the equipment you need.

ATLANTA CONTRACTOR CALLS THEM...

the mixer champs

Listen to Mr. E. J. Kelley, vice president and general manager of MacDougald-Warren, Inc., construction contractors of Atlanta, Ga., as he praises his new Mack B-42 six-wheeler concrete mix trucks.

"Throughout the Greater Atlanta area, which we serve," says Mr. Kelley, "no other trucks can measure up to Mack six-wheelers for mixer operation, both in heavy traffic and over rough ground. They're champs for economy and dependability because they're free from breakdowns on the job."

Wherever you go, you'll find plenty of prominent concrete mix operators like Mr. Kelley who swear by Macks. For trucks that will keep rolling under heavy payloads . . . in fast, uninterrupted schedules . . . take their tip and make greater profits with Macks.

MACK TRUCKS Empire State Building, New York 1, N. Y.

3025

BY THE CUBIC YARD...

air-entrained concrete

costs less with ERTRANE® C

"...and that's the way to figure it!"

You're going to save real money per cubic yard of air-entrained concrete when you use Ertrane C, Nopco's quality air-entraining agent. So don't let its slightly higher price prevent you from trying it.

Here's how you save, as proved in practice by leading cement manufacturers and concrete mixers:

1. No caustics needed. Unlike some powdered additives, Ertrane C makes a uniform solution in either hot or cold water, *without* adding caustics to neutralize.

2. Ease of handling and storage. Ertrane C is packaged in a 60 lb. multiwall bag. No danger of freezing.

3. Lower freight rates. Ertrane C is 100% active; you are not paying freight on water.

4. Flexibility of use. Ertrane C can be used either dry or in solution. 3 bags (180 lbs.) of Ertrane C into 125 gallons of water makes a 15% solution.

Write today for complete information on Ertrane C. Nopco Chemical Company, 638 Industrial St., Harrison, N. J.

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.

Don't buy any other truck mixer till you've seen

Worthington MIXERAMA!

"On-Your-Job" demonstration shows why Worthington's HI-UP Truck Mixer does a better job

We believe the best way to prove to you that no other truck mixer can match a Worthington Hi-Up is to let you watch one at work.

We call this down-to-earth demonstration Worthington MIXERAMA. You'll call it the real test of truck mixer performance. Worthington distributors across the country want you to be their guest at one of these fascinating shows.

What will you see?

- You'll see exactly how Worthington Hi-Up Truck Mixers are designed for maximum payload.
- You'll see how fast it discharges . . . even with low-slump concrete.
- You'll see a really *rugged* transmission — *specifically designed* for a truck mixer. Single-lever operation.

Be our guest — or we'll be yours

You can watch Worthington MIXERAMA in one of two ways:

1. You can tell your Worthington distributor you want to see a Hi-Up in action on your own stamping grounds — loading at your plant, delivering concrete to your customers. And make sure you pick a day when you've got a *tough* pouring job to do!
2. You may attend a MIXERAMA in your area. The distributor will tell you where and when.

Call your distributor now

Make arrangements today to see Worthington MIXERAMA — either working from your batching plant or from a Ready-Mix plant in your area. You'll be glad you did — almost as glad as you'll be when you can call one of these hardworking truck mixers your own. Worthington Corporation, Concrete Machinery Division, Section R.5.1, Plainfield, N. J. R.5.1

MIXERAMA'S on the way to you!

WORTHINGTON

If it's a Concrete Job, it's a HI-UP *Job*

Rock Drills • Wagon Drills • Pavers • Concrete Mixers • Portable Pumps • Portable Compressors

NO BETTER Block Machine than a TRI-MATIC

Can't be beat for

power, ruggedness and production

No block machine on the market today exceeds the TRI-MATIC for the essential features of heavy-duty construction, designed for and producing the finest block at maximum speed.

If you want high production, Tri-Matic will give you 1000-8" block per hour (or equiv.) with proper aggregate. If you want power and ruggedness, just check the size of all motors, shafts, pulleys, etc. . . . AND—not one ounce of quality workmanship or material is sacrificed ANYWHERE on a TRI-MATIC.

Compare a TRI-MATIC WITH ANY MACHINE ON THE MARKET. We repeat, it can't be beat!

CHOOSE YOUR TERMS:—

1. CASH
2. TIME PAYMENTS
3. "LEASE-WITH-OPTION-TO-BUY" CONTRACT

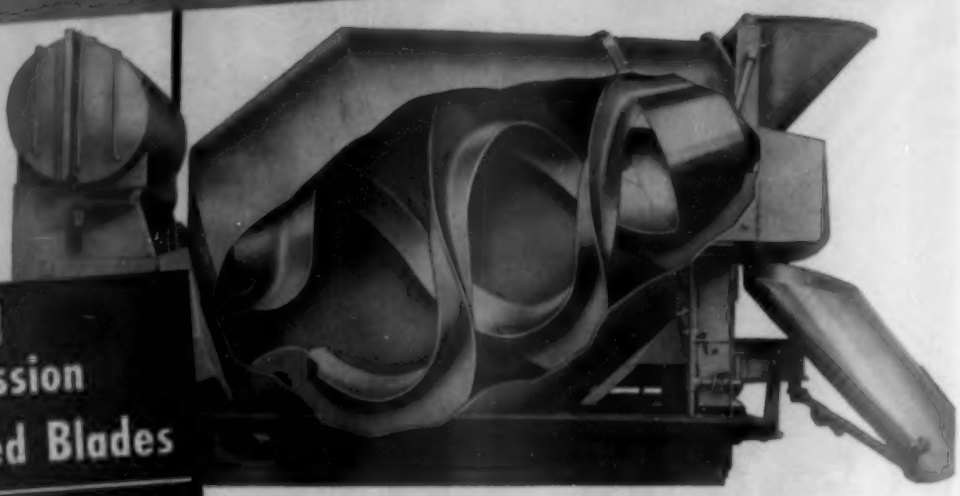
(NON-ROYALTY, FIXED MONTHLY PAYMENT)

BERGEN
MACHINE & TOOL CO., INC.

NUTLEY, NEW JERSEY

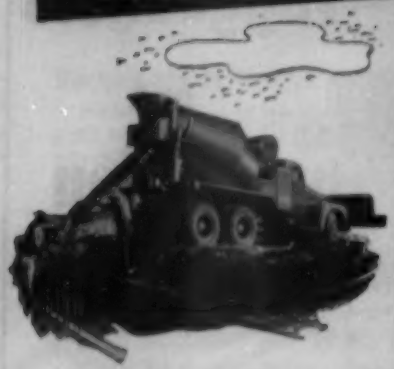
Cable Address: "BERGENCO" (Nutley, N. J.)

SMITH
DE LUXE TRUCK MIXERS



Cutaway view of the Smith De Luxe Truck Mixer drum. Note the patented "T"-shaped blades — the greatest improvement in mixing action ever put into a truck mixer drum.

2-Speed Transmission
+ T-Shaped Blades
= Better Mixed Concrete



Want Quality Concrete... in a Hurry?

If you do, the Smith "concrete factory" with the PATENTED "T" SHAPED BLADES and 2-speed transmission, is your answer. In any inclined axis drum the heavy rock naturally rolls to the lowest point, and the fines will float. Smith has the *only* blade which counteracts this segregation. The mix is pulled to the big end of the drum, picked up, turned over, and poured into the center of the batch. True flow action takes place.

The 2-speed transmissions, standard on Smith mixers, give you the complete range of drum speeds needed regardless of the length of haul. You never need to undermix or overmix in a Smith . . . you have complete control.

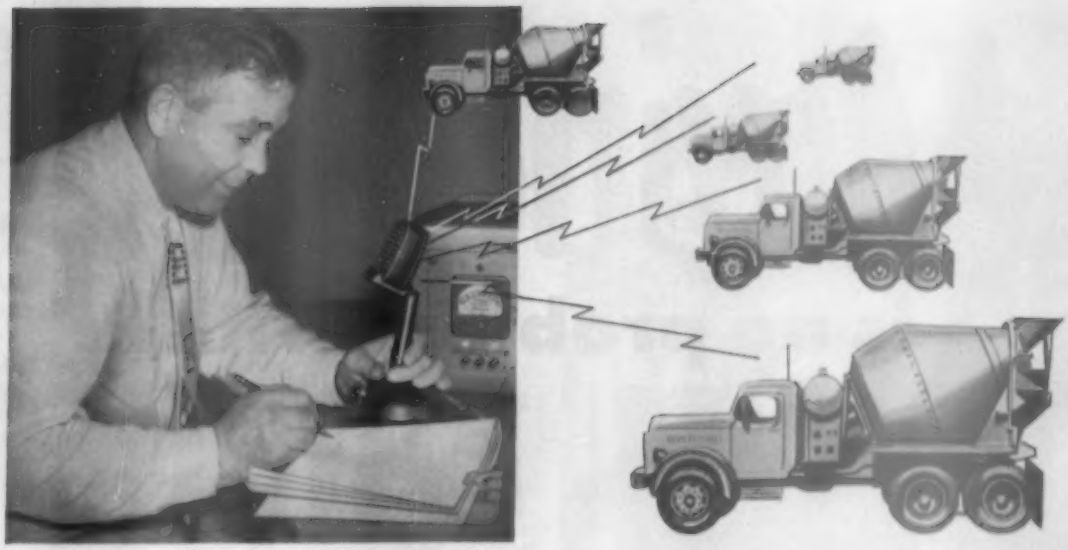
The proof is in the concrete which you discharge from your Smith . . . the last shovelful out of the drum is exactly the same as the first shovelful. Call or write your nearby Smith dealer for complete details.

The T. L. SMITH CO., 2885 N. 32nd St., Milwaukee 10, Wis. U. S. A.
Affiliated with Essick Manufacturing Co., Los Angeles, California

SMITH
T. L. SMITH CO. MILWAUKEE

Builders of Better Mixers for More Than 50 Years

A 8516-1P



2-way radio **production** control

helps you pour **more** concrete with **fewer** trucks

Constant radio contact with every one of your trucks and service cars gives you *control* over your entire operation and more work and profits out of each truck.

By quarterbacking close plays right from his chair, your dispatcher can eliminate costly emergencies before they happen . . . can cut costs a dozen ways.

Motorola 2-way radio saves you $ $ Dollars per day per truck, not only paying for itself, but earning extra profits for you from the *first day* it's installed. Write—wire—or phone, TODAY.

Motorola will furnish the equipment YOU need on the terms YOU want — cash purchase, installment plan, lease (with or without equity) . . . with optional installation and maintenance all included in a single contract.

Messages like these cut costs, make profits for you.

Dispatcher to truck 17 — "Customer just called from Johnson pour — forms not ready . . . skip it and double over to Becker job at 7th and Walnut — dump load there and report."

Truck 4 to dispatcher — "Niles School job needs just 8 more yards of mix to complete."

Dispatcher to Batching Plants — "8 more yards needed for Niles . . . then cut."

Truck 11 to dispatcher — "Got a flat 10 seconds ago . . . rush a spare out — 2 miles from town on Highway 17."

Dispatcher to truck 11 — "Truck on way . . . will be out in 8 minutes — don't worry."

Trucks are rerouted instantly by radio when necessary, or emergency help dispatched.

Driver lets dispatcher know when he arrives, job progress, when he'll be back.

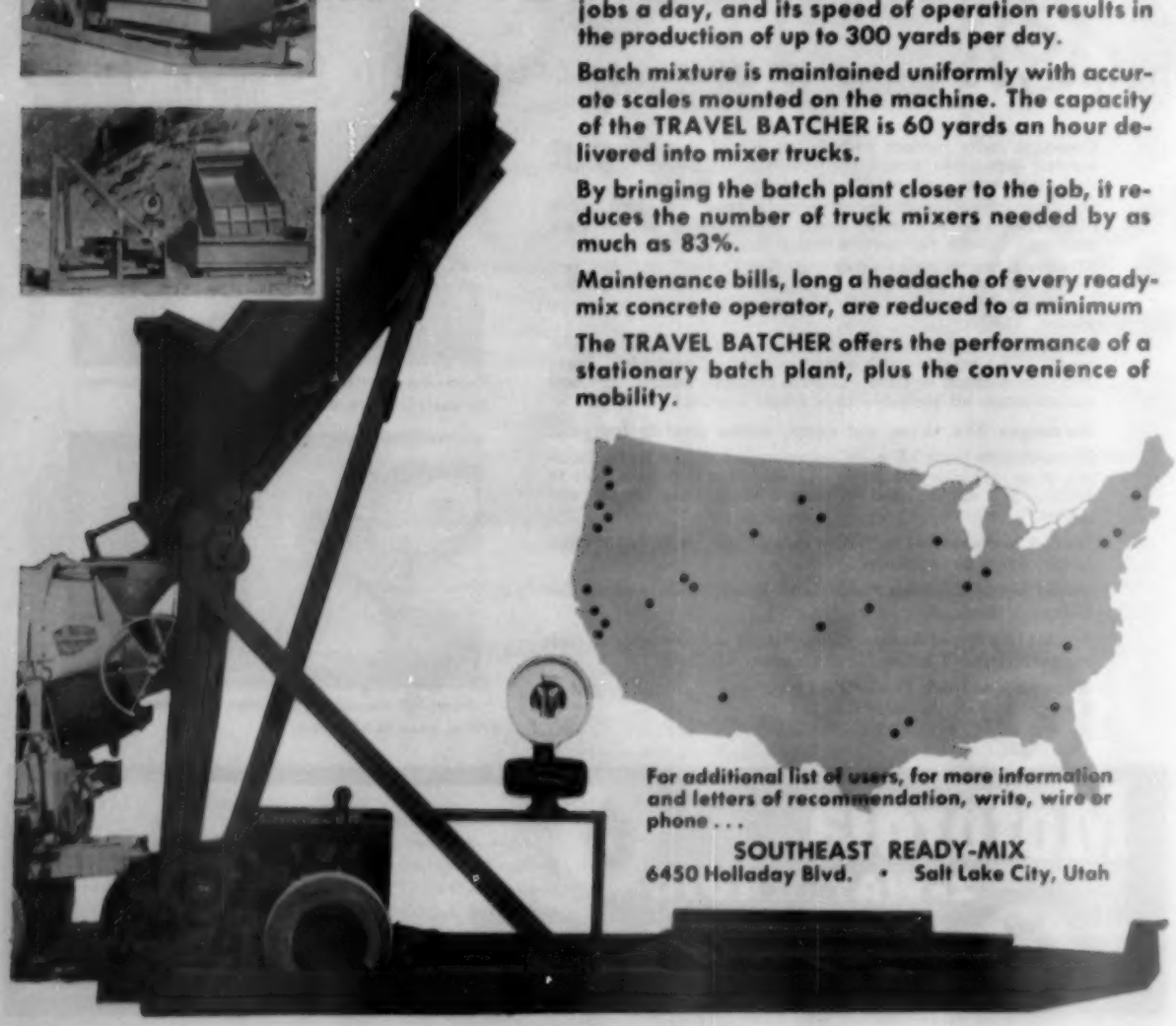
Motorola
2-WAY RADIO

Motorola Communications & Electronics, Inc.
A SUBSIDIARY OF MOTOROLA, INC.
4501 AUGUSTA BOULEVARD, CHICAGO 51, ILLINOIS
ROGERS MAJESTIC ELECTRONICS LTD., TORONTO, CANADA

Motorola consistently supplies more mobile radio than all others combined— proof of acceptance, experience and quality.
The only COMPLETE radio communications service — specialized engineering . . . product . . . customer service . . . parts . . . installation . . . maintenance . . . finance.
"The best costs you less — specify Motorola".

Moving Day
is no problem with
TRAVEL BATCHER

The hopper can be recharged with either a dump truck or a front-end loader, and can be used with 3-, 4-, or 5-yard mixers.



MOVING DAY is no problem with the new on the job TRAVEL BATCHER. Instant maneuverability makes the TRAVEL BATCHER available for several jobs a day, and its speed of operation results in the production of up to 300 yards per day.

Batch mixture is maintained uniformly with accurate scales mounted on the machine. The capacity of the TRAVEL BATCHER is 60 yards an hour delivered into mixer trucks.

By bringing the batch plant closer to the job, it reduces the number of truck mixers needed by as much as 83%.

Maintenance bills, long a headache of every ready-mix concrete operator, are reduced to a minimum

The TRAVEL BATCHER offers the performance of a stationary batch plant, plus the convenience of mobility.

For additional list of users, for more information and letters of recommendation, write, wire or phone . . .

SOUTHEAST READY-MIX
6450 Holladay Blvd. • Salt Lake City, Utah

Single Aggregate Supply System Serves Block, Pipe and Ready-Mix Plants

• Pinellas Industries, St. Petersburg, Fla., operates 11 transit mix trucks, a block plant producing 9000 units per day, and concrete pipe plant

Belt conveyor emerging from tunnel beneath four stockpiles carries aggregates to the top of ready-mix plant. Control board at this point permits one man to operate conveyors

AN UNUSUALLY INTERESTING material supply system has been set up by Pinellas Industries, St. Petersburg, Fla., to serve its concrete block, pipe and ready-mixed concrete operations. The ready-mixed concrete plant has a capacity of 750 cu. yd. per day, and operates 11 transit-mix trucks. Concrete block production is 9000 standard 8- x 8- x 16-in. block in an 8-hr. shift, and the pipe plant produces 230 units of 12-in. and 54 units of 60-in. pipe every shift. All these operations obtain aggregates by an efficient system of belt conveyors and bins capable of handling 300 t.p.h. The system was designed and engineered by R. I. Gunnell, Yancey Bros. Co., Atlanta, Ga., and the Barber-Greene Co.

Several sizes and types of aggregate material are required for the various operations. These include sand, limestone screenings, crushed granite and other crushed stone, ranging in size downward from 1½ in. All of these materials are delivered in bottom dump railroad cars.

The car to be unloaded is positioned above a Butler steel track hopper and the car's bottom hoppers are opened. The track hopper is equipped with clamshell gates which discharge onto a 24-in. belt conveyor, 193-ft. centers, operating at an angle of 18 deg.

The first inclined conveyor discharges onto a 24-in. reversible shuttle conveyor, 93-ft. centers, which is supported on a steel structure, 38 ft. above ground level. Heavy duty concrete bulkheads separate four piles of aggregate and eliminate contamination. This provides a stockpile area approximately 280 ft. long and 100 ft. wide, providing a total storage of approximately 4500 tons.

Beneath the stockpiles, there is a tunnel housing a 24-in. horizontal belt conveyor, 295-ft. centers. To feed this conveyor, hand-operated clamshell feeders are spaced on 5-ft. centers. This close spacing reduces the dead storage area in the separate stockpiles. A total of 20 feeders are installed, six serving each of the two large end stockpiles and four serving each of the smaller center piles.

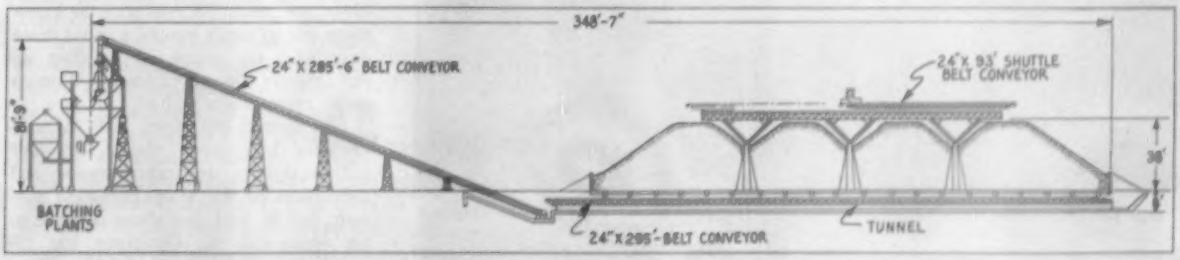
The tunnel conveyor discharges onto a 24-in. inclined belt conveyor, 285-ft. centers. Like the first conveyor in the system, this operates at an 18 deg. slope, and discharges into a central control turnhead atop the Butler bin batching plant. This turnhead is located 82 ft. above ground level.

Although both the block plant and ready-mixed concrete plant are gravity fed through a bin system, at this point the conveyor system continues in order to serve the pipe plant, which is located across the railroad tracks from the other installations, in order to provide for future expansion and maximum storage area.

A bypass chute is fitted to the turnhead assembly which permits discharging aggregate onto a 24-in. belt conveyor, 63-ft. centers, which spans the tracks and delivers the aggregate to the pipe plant. All belt conveyors in the plant are Barber-Greene.

A separate track is maintained for cement cars. They are unloaded by under-track screw conveyors, and the cement is elevated to the bins with elevators. The bin storage facilities throughout the installation, as well as the batching equipment in the ready-mixed concrete plant, were supplied by Butler Bin Co.

(Continued on page 166)



Elevation details of conveyor system serving ready-mix, concrete block and pipe plant

IMPROVING METHODS of Pipe Manufacture and Installation

• American Concrete Pipe Association annual convention in Boston, Mass., March 10 to 12, discusses technical problems, specifications, and new uses for concrete pipe

John A. Volpe, Commission of Public Works of Massachusetts, left, with President A. W. G. Clark

THERE WAS NO ESTABLISHED THEME for the 47th Annual Convention of the American Concrete Pipe Association but it was obvious when the three-day meeting was concluded on March 12 in Boston that manufacturers and users alike are looking to the future for improved methods. Some 250 representatives of the concrete pipe industry gathered in Boston's Sheraton Plaza Hotel on March 10 through 12 to discuss industry activities.

The meeting was highlighted by prepared papers presented by four representatives of top New England engineering firms and by an informal presentation by Dr. Richard Pomeroy, a prominent West Coast consulting engineer.

Bureau of Public Roads personnel met with the Technical Problems Committee of the association prior to the general meeting to discuss the proper installation and use of concrete pipe under high fills as culverts for the nation's highways.

New Officers

A. W. G. Clark, president of the B. C. Concrete Co., Ltd., Vancouver, B. C., Canada was re-elected president of the association through 1955. E. F. Bespalow, vice-president of Choctaw, Inc., from Memphis, Tenn. was elected a vice-president along with re-elected vice presidents Hugh P. Ford of the Eugene Concrete Pipe & Products Co., Eugene, Ore., and Harry W. Heath, vice-president of the Lock Joint Pipe Co., East Orange, N. J.

David A. Decker, Mid-West Concrete Pipe Co., Franklin Park, Ill., was re-elected secretary. J. D. Mollendorf of Continental Concrete Pipe Corp., Chicago, Ill. was re-elected treasurer. Glen R. Blackburn, vice-president of Texas Concrete Works in Waco, Texas was elected a director as were Henry O. Strohecker, Jr., president of the Carolina Concrete Pipe Co., Inc., Charlotte, N. C., and Richard I. Young, vice-president of the United Concrete Pipe Corp., Baldwin Park, Calif.

High Strength Culvert Pipe

Engineers F. M. Cahaly, Miles N. Clair, Francis A. Obert and Herman G. Protze presented papers of considerable interest. They cited examples of where concrete pipe had been properly and improperly installed and they recommended certain improved manufacturing techniques. They called for cooperative undertakings to improve the techniques of installing concrete pipelines so as to utilize their inherent good qualities. Specifications or recommended practices were called for which could be readily understood by field personnel and which could be complied with under an ordinarily competent inspector or supervisor.

The Technical Problems Committee of the association and Eric L. Erickson of the Bureau of Public Roads discussed the fact that increased heights of fill will call for concrete pipe which is even stronger than presently used culvert pipe. Installations in California, Washington, North Dakota and elsewhere have shown that concrete pipe as manufactured today can be installed under tremendous heights of fill without showing signs of distress. However, where these conditions are not designed for or where it is more economical to specify a stronger pipe than an increase in the quality of the bedding and backfilling, there will be a need for a stronger concrete pipe. Indications are that such designs will be presented and tested within a short period of time. John A. Volpe, Commissioner of the Department of Public Works of Massachusetts opened the general meeting with a welcome address conveying the best wishes of Governor Christian A. Herter to the construction industry and its allied fields. Mr. Volpe's words from the Governor were "It was nice to know there are so many people around these days who are intent on building up our country instead of tearing it down as so many seem to be."

He pointed out since 1948 Massachusetts has spent almost one-half billion dollars on improvement and expansion of the state highways system, but he said that there is more to be done and the Governor has requested appropriations of 150 million

"Jam Session" panel. Left to right: Edward M. Brickett, Hume Pipe of New England, Inc.; J. A. Ruhling, Washington representative of the A.C.P.A. acting as temporary moderator for E. F. Bespalow; F. A. Trautner, New England Concrete Pipe Corp.; and B. L. Lytell of Lytell & Colgrove

dollars more to carry on this work. President Eisenhower's highway plan might cut five to eight years off of the Massachusetts program, Mr. Volpe said.

President's Report

President A. W. G. Clark, reported on his first year as the association president. Mr. Clark, a Canadian by birth, traveled to all parts of the United States acquainting himself with industry problems and attending various meetings in certain sections of the nation. He pointed out that relationships with allied industry, such as the Portland Cement Association, have been even more cooperative than in the past and should continue to improve. The outlook of the concrete pipe industry at its 46th Convention in San Francisco, a year ago, was far less optimistic than the present. In spite of the increased market for concrete pipe and a more aggressive sales program on the part of the concrete pipe manufacturers, it was emphasized that the industry must sell its product and bring its advantages to the attention of all prospective purchasers. John A. Ruhling, Washington representative of the American Concrete Pipe Association reported on progress in the nation's capital on the recognition by Government agencies of various features of concrete pipe such as its hydraulic efficiency.

Recognition by the United States Army and the United States Navy and the Bureau of Public Roads of the proper relative toughness of culvert and sewer materials will lead to a better utilization of concrete pipe in the future, Mr. Ruhling said.

Howard F. Peckworth, managing director of the American Pipe Association reported on the progress of the industry in the past ten years since he became its managing director.

More Uses for Concrete Pipe

F. M. Cahaly, senior engineer of Fay, Spofford & Thorndike presented a paper entitled "Experiences In The Use Of Concrete Pipe." Mr. Cahaly said that one is apt to find concrete pipe in nearly all types of construction work.

He discussed several of the projects undertaken by Fay, Spofford & Thorndike in using concrete pipe. Some of these jobs were in Mariemont, Ohio in the development of the community; a storm drain and sanitary sewer system in Manchester, N. H. about 30 years ago; enclosing of a brook traversing an airport runway at Brunswick, Me.; the complete sewer system for the city of Cranston, R. I. in 1938 and in 1948, and improvements to the sewer system of Bristol, R. I. Mr. Cahaly discussed the installation of a sewerage system for the town of Sagus where several types of soil and ground water were encountered in numerous places resulting in extremely diversified construction methods. The conclusion of his talk was devoted to uses of concrete pressure pipe for water supply systems. Mr. Cahaly described some of the concrete pipe used under turnpikes in New Jersey and West Virginia. He told of pipe under the West Virginia turnpike which was distressed due to improper bedding and backfilling procedures.

Members and their wives being entertained at "Hugo's Lighthouse" in Cohasset, Mass., where over 250 persons attended

Better Specifications Needed

Miles N. Clair, president, The Thompson & Lichtner Co., Inc., presented a paper entitled "Concrete Pipe — A Consultant's Viewpoint." He stated that concrete pipe is used throughout the world and has given excellent service under a wide variety of conditions and requirements. Improvement in quality, reduction in cost and increased use are dependent on recognition of causes of trouble, development of processes, continued research

(Continued on page 167)

F. M. Cahaly, senior engineer, Fay, Spofford & Thorndike, Boston

The 1955 Board of Directors and officers of the American Concrete Pipe Association. Left to right, rear: Howard F. Peckworth, managing director; Richard I. Young, United Concrete Pipe Co., Baldwin Park, Calif.; C. M. Adams, proxy for Peter Van Kuran, American Pipe and Construction Co., South Gate, Calif.; Ivy H. Smith, Sherman Concrete Pipe Co., Jacksonville, Fla.; Henry C. Eames, New England Concrete Pipe Corp., Newton Upper Falls, Mass.; Geo. B. Denham, Faulkner Concrete Pipe Co., Hattiesburg, Miss.; R. A. Norman, The Cretex Companies, Inc., Elk River, Minn.; Henry O. Strohecker, Jr., Carolina Concrete Pipe Co., Charlotte, N. C.; R. B. Carroll, Sherman Concrete Pipe Co., Inc., Birmingham, Ala. Seated, left to right: treasurer, J. D. Mollendorf, Continental Concrete Pipe Corp.; secretary, David A. Decker, Midwest Concrete Pipe Co., Franklin Park, Ill.; vice-president, E. F. Bespalow, Choctaw, Inc., Memphis, Tenn.; president, A. W. G. Clark, B.C. Concrete Co., Ltd., Vancouver, B. C., Canada; vice-president, Harry W. Heath, Lock Joint Pipe Co., East Orange, N. J.; and vice-president, Hugo P. Ford, Eugene Concrete Pipe and Products Co., Eugene, Ore. Director Glen R. Blackburn, Texas Concrete Works, Waco, Texas was not present

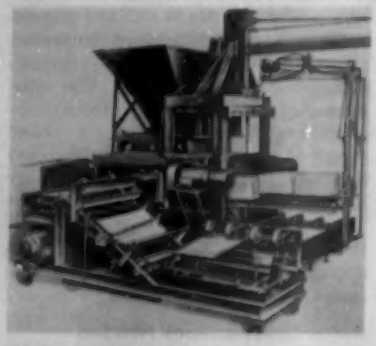
NEW MACHINERY

Concrete Packaging Machine

BEMIS BRO. BAG CO., 408 Pine St., St. Louis 2, Mo., has developed the Gravity Packer machine for packing dry ready-mixed concrete products. A three-bucket scale weighs and dumps three separate ingredients of the mix, such as cement, sand and gravel, and a volumetric auger device adds small quantities of a fourth ingredient, such as a binder for plastic mixes, when needed. The filled bag drops on a conveyor and is carried through the sewing head for closure. Either one or two-man operation is possible, filling bags of various sizes. Speeds depend on size of bag and number of operators.

Truck Mixer

COOK BROTHERS EQUIPMENT CO., 3334 San Fernando Rd., Los Angeles, Calif., recently introduced the Challenge "Pacemaker" truck mixer, available in eight sizes from 3 to 8 cu. yd. capacities. It is also available in four side engine models, ranging from 5- to 6½-cu. yd. sizes, and two power-take-off models, 3 and 3½ cu. yd. sizes. Features include: short overall length, moving the center of gravity forward, for use on shorter wheelbase trucks; a $\frac{3}{16}$-in. high tensile, abrasion and corrosion resistant steel plate drum; "L" shaped discharge blades; secondary discharge fins for smooth flow and to eliminate surging; and two-speed operation with standard industrial transmission. The "Mixometer" ready-mixed concrete quality control, is also featured as standard equipment on the truck mixers. It shows the number of drum revolutions per minute, with recommended speeds for best charging, mixing and agitating. It also records the total number of drum revolutions per trip and gives a running total of revolutions for the life of the mixer.



Front Pallet Return

THE LITH-I-BAR CO., Holland, Mich., has introduced an automatic front pallet return for use on Lith-I-Bar block machines. As the green block is placed in the curing rack, the magnetic off-bearer is lowered onto the shelf below. As the off-bearer is positioned under the next load of green block at the machine, the magnet is released, allowing the empty pallets to drop to the conveyor chain of the automatic pallet return. Before re-use, the pallets are carried through scraping, brushing, oiling and wiping stations and fed back into the pallet magazine of the machine. Excess oil drains back into the reservoir where it is strained for re-use.

The unit is self-contained. A magnetic starter is supplied for the motor and adequate overload protection is provided by overload relay heaters directly mounted on the unit. It is ball-bearing equipped throughout, and gears are completely enclosed and oil-bath lubricated.

Discharge Chute Controls

MONARCH ROAD MACHINERY CO., 1331 Michigan St., N. E., Grand Rapids 6, Mich., has announced the "Dyna-Chute Kit," automatic hydraulic controls for the discharge chute on transit mixers. The kit consists of a pump-motor hydraulic assembly; single-acting hydraulic ram; insulated electric cable; high pressure hydraulic hose; and pipe fittings, bolts, nuts, pins, washers, etc. The hydraulically-controlled "Dyna-Chute" has a capacity of one ton or more, even when the mix is running. It holes automatically when the control valve is in neutral, and will not lower or raise until the driver switches the handle.

Concrete Block Unloader

IMPERIAL CONSTRUCTION EQUIPMENT CO., 230 West North Ave., Northlake, Ill., has introduced the "Kid Glove" concrete block unloader, featuring "hydraulic-squeeze pickup." Hydraulic pressure rams bring rubber pads into firm contact with block of various shapes and sizes, eliminating pallets, bars or special attachments.

Batch-Type Mixer

THE LITH-I-BAR CO., Holland, Mich., has added a batch-type "Lith-I-Mixer" to its line of concrete products equipment. Interchangeable, identical sized Ni-Hard liners are used on the drum shell and discharge door, and the mixing blades are also of Ni-Hard steel. The motor and countershaft sheaves with multiple V-Belt drive are completely enclosed, as are the drive and pinion gears, which are available with grease or oil-bath lubrication. Features include a double-hinged drum guard; felt seals around the rotor and countershafts to keep out abrasive dust and grit; rotor shaft ends are turned to close tolerances; and a full length water manifold for even distribution of mixing water. The mixer is available in 30- or 50-cu. ft. capacities.

PREVENTIVE Maintenance In the Ready-Mixed Concrete Industry

31: A producer views the ready-mixed concrete business. This article of series is on forms for maintenance and cost records

By JAS. A. NICHOLSON*

GREATER COMPETITION, lower selling prices (due to competition), higher labor costs and increased operating expense, together with a sincere desire, on the part of some operators, to give improved service, have alerted concrete producers to the importance of more closely controlling operating and maintenance expense. Intelligent operators realize that the answer of ever larger truck mixer loads is not a permanent solution to the related problems of rising costs and declining profits. They stop squandering money by buying the right kind of concrete hauling units, hiring competent drivers, developing effective preventive maintenance routines and installing efficient cost control systems.

Cost items, such as gas and oil consumption, mechanical defects, unsatisfactory trucking equipment, avoidable axle breaking, and faulty tire performance are brought under control. Aggressive continuing steps are taken to eliminate such profit-reducing factors as the purchase of trucks that are too light for the job, the use of high upkeep "landmarks," "axle breakers" and "garage sitters," unnecessary breakdowns, excessive downtime, premature tire failures and unproductive labor hours.

Job for Cost-Conscious Employe

A cost-conscious key employe is given the responsibility for overall supervision of production, delivery and maintenance costs. A performance record and cost control sheet is kept on each individual truck and mixer. Forms such as driver's daily checks, time cards, daily log reports, shop repair orders and tire-change cards are regularly used to furnish the information that is periodically entered on the permanent individual cost control records. Through careful planning, an effective preventive maintenance program is put into operation.

The initial step in putting into execution a carefully planned preventive maintenance program is a complete appraisal of all units in the fleet. As part of the original inspection, a thorough fact finding report on operating condition is prepared for each trucking unit. The soundness of the preventive maintenance program will be largely determined by the integrity of the man or men making the original inspections and preparing the reports.

The heading of the individual truck record report should contain such information as model, serial number, engine number, date of purchase, company's own number for vehicle and mileage at time of inspection. There should be a listing of other important data, including means of identification for starter, carburetor, generator, transmission, differential, gear ratio, wheel base and tires.

Opinion of present operating condition of each individual truck should be stated; namely, OK, needs adjustment, should be tightened, needs repairs, requires overhaul or should be discarded and replaced. This section should include essential explanatory remarks that will assist supervisors and mechanics in carrying out inspection suggestions. Inspection report recommendations on adjusting, tightening, repairing and overhauling should be carried out on a planned schedule basis.

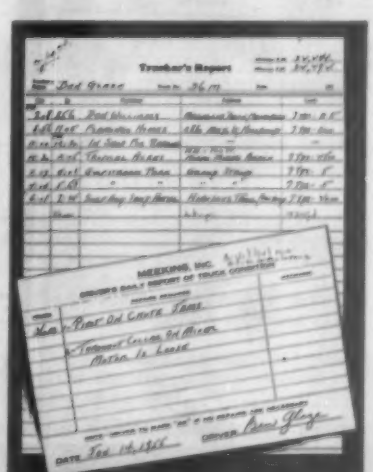
Cost Control Forms

Entries on cost-control forms, (provided by a truck manufacturer or developed specially for a producer's organization) should be periodically made so that expenses of owning, operating and maintaining, can be segregated, then combined into expense groupings; such as, depreciation, drivers' wages, garage labor, gas, oil and grease cost, garage supplies, tire repair and recapping, truck and mixer parts from stock, outside labor and parts.

The totals of all these charges, divided by the number of cubic yards hauled during a given period, by total miles or total operating hours, give a producer average operating and maintenance costs per cubic yard, per mile or per hour of operation. Through individual truck breakdowns of these expense totals, a producer can quickly determine the actual per cubic yard, per mile or per operating hour cost of each mixer truck.

These individual determinations help a producer to ascertain drivers qualifications, check on garage operations, evaluate mechanics, greasers, and tire-care man's performance, spot high upkeep mixer truck units and eliminate unsatisfactory delivery equipment.

On a critical Turnpike job involving tough ground conditions, a clutch went out on a mixer truck, interfering with concrete placement and embarrassing our relations with an important customer. Investigation showed that the truck had been in no shape to be sent to this job. The driver admitted that the clutch had been going out for a month and claimed that he had repeatedly reported the trouble. Further study developed there had been no written report, that no report of any kind had been made to the responsible maintenance employe and also that the plant superintendent had been careless in requiring drivers to fill out daily checking reports on equipment condition.

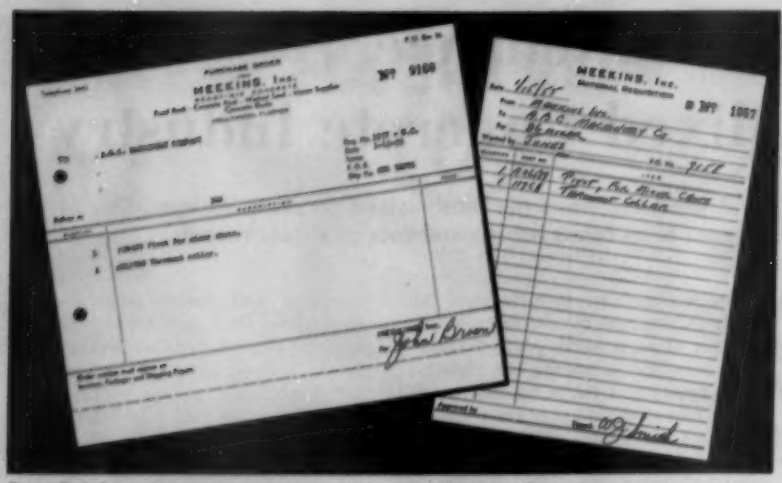


Form 1, below, is the driver's daily report of truck condition. Above, form 5, is the driver's daily log card

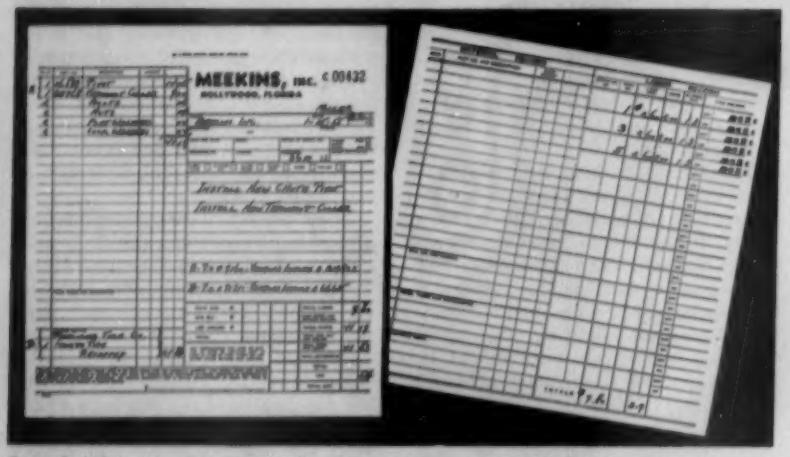
Daily Operating Condition Report

This incident provided the impetus for us to develop a realistic daily operating condition report, made a component part of a combination daily log and time card. This incident, a climax to other somewhat similar incidents finally made us realize that too many drivers will take chances that a producer can't afford, that dependence on verbal reports is an unnecessary risk and that a written daily driver report on operating condition of truck

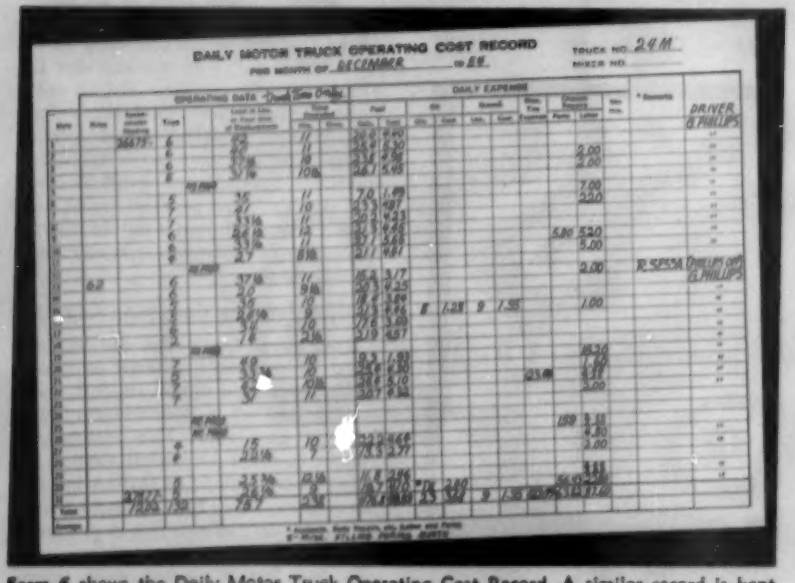
*Pres., Nicholson Concrete Co., Toledo, Ohio.



Form 3, left, is the purchase order, and to the right, **form 3**, is the material requisition for the parts ordered. The purchase order is in triplicate



Form 4, left is a combination work order and cost record, in triplicate, and to the right, is the back of the third copy. This copy is on heavier stock as it serves as a record



Form 6 shows the Daily Motor Truck Operating Cost Record. A similar record is kept for the mixer unit

and mixer is a basic requirement in an effective preventive maintenance program.

A number of producers who use a weekly time card have their drivers fill out daily log sheets. It is my opinion that the most effective control (other than radio) over driver personnel can be established by using a combination log, time and operating condition report card. This combination card should provide daily information on working hours, job destinations, gas and oil consumption, mileage, cubic yards, number of trips, job holdups, trip breakdowns, washout time, other downtime and any needed services or repairs.

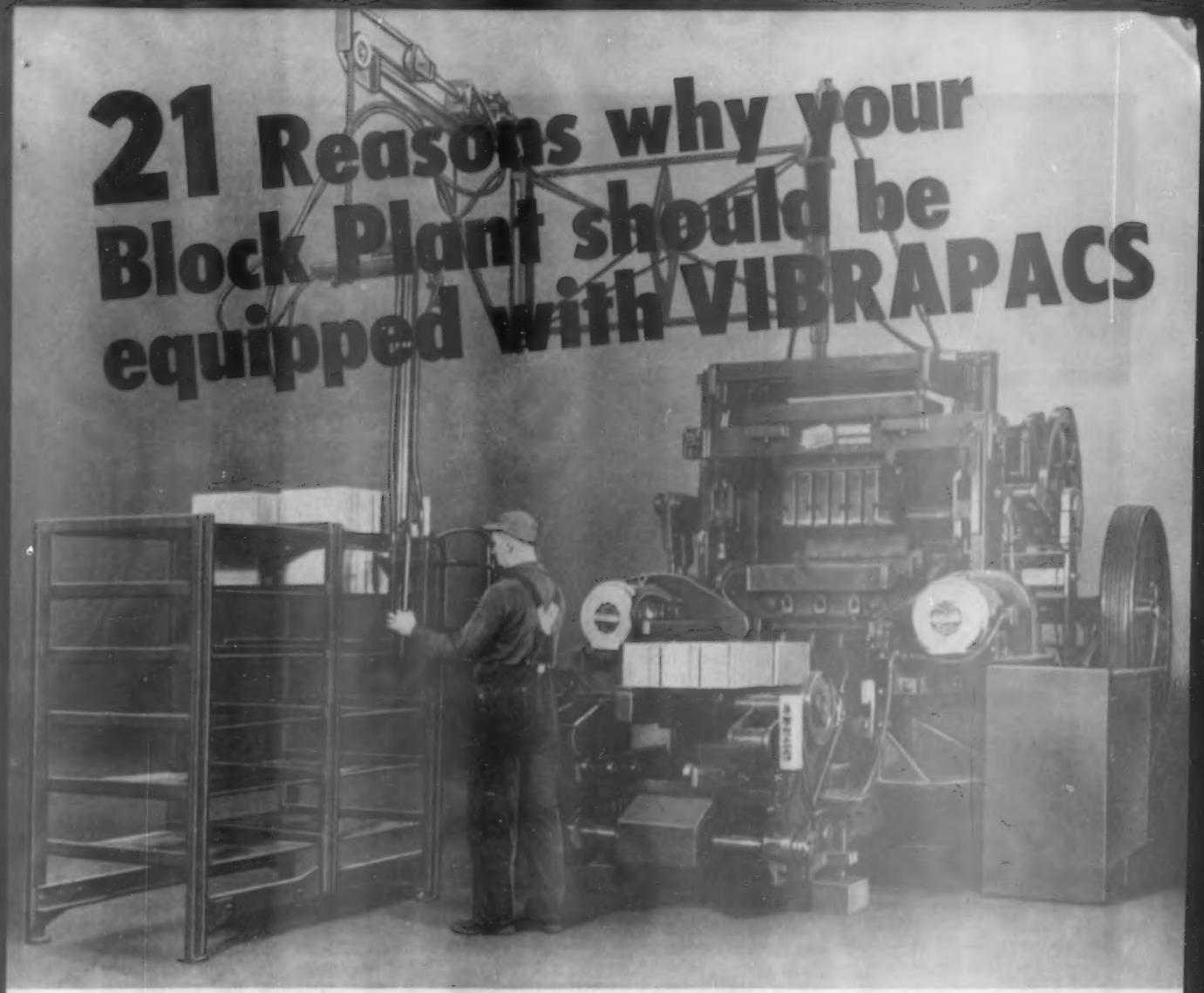
Many alert, cost-conscious operators in Canada and the United States have long used driver operating condition reports as a primary record in an integrated cost control system. The daily report on condition of truck and mixer may be written out and handed in by the driver or may be given verbally to the dispatcher or other responsible person who prepares the report which the driver signs. Whichever procedure is followed, it is important that company insistance on daily preparation be followed to the point where driver compliance is automatic.

At our operations, the daily equipment condition report is placed on the reverse side of the daily time card. Each driver must make a daily certification. If no attention is required, the driver writes a big O.K. across the face of the report. If the driver has trouble to report, he checks the needed services or repairs and gives his opinion whether the truck can be safely operated before the repair work is completed. If there is doubt about safe operation, the decision is made by the mechanic or in his absence, by his assistant. If repairs must be made before the unit can be operated, they are completed by the night man or the truck is withheld from service until the conditions are corrected. The drivers daily reports are important guide posts in helping the maintenance superintendent plan his garage work schedule.

All maintenance and repair work is begun through the issuance by the maintenance superintendent of a Shop Repair Order made out to the garage staff or to an outside garage. This S.R.O. which is numbered, is made out in triplicate. The original is retained by our mechanic or the outside garage until the work is completed, the second copy is sent to the main office to alert our cost man that the job is being done and the third copy is retained by the maintenance superintendent for record information.

The mechanic, as he progresses with

21 Reasons why your Block Plant should be equipped with VIBRAPACS



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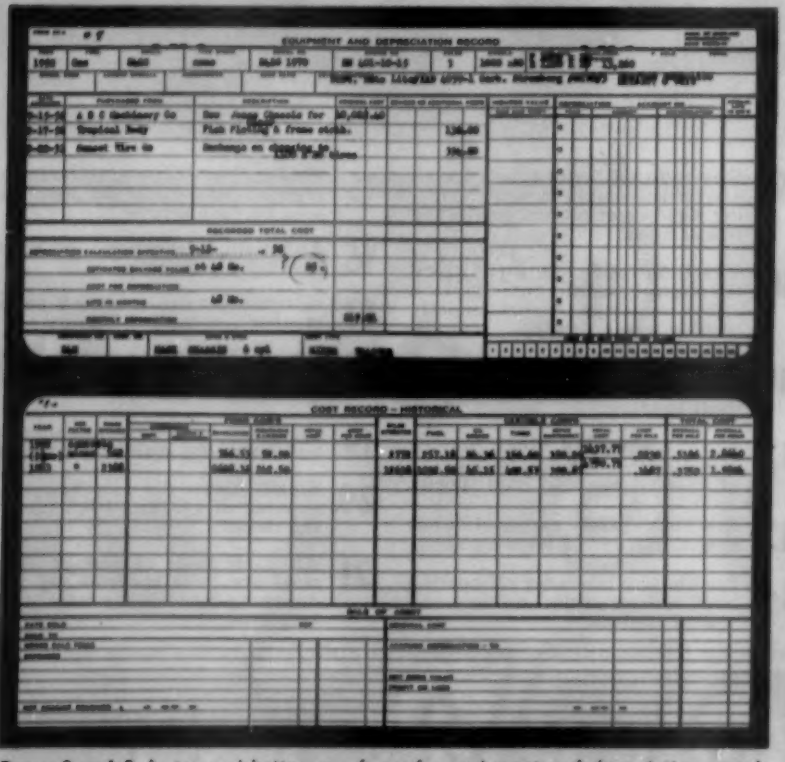
Form 7 *is a yearly motor vehicle cost record*

the repair work, lists full information on labor time and material expense (replacement parts — whether from stock or purchase.) If parts must be bought, the purchase order number is listed. When repair work is completed, the mechanic gives the filled-out original copy to the maintenance superintendent who prices out the labor and material charges. After this key employe has made his own entries, the copy is forwarded to the cost man at the company office.

In personally keeping tab of each piece of equipment owned by the company (approximately one-half of our delivery trucks are now broker owned) our maintenance superintendent uses an individual vehicle record folder made available to us through the Socony-Vacuum Oil Co., Inc. This company, one of our suppliers of gas, oil and greases, furnished a maintenance engineer who assisted us in planning our preventive maintenance program. While we hope some day to have all our own forms, the Individual Vehicle Socony record folder is giving our superintendent effective control over mixer truck performance and maintenance. It provides a medium for establishing a regular schedule of inspection, lubrication, service and repair. The folder, as presently used in our operations, does not give sufficient cost control nor always point out high upkeep equipment.

In putting together final figures, our cost man has used a 14 column accountant's ledger sheet in establishing accurate cost figures for our fleet operation. We have dependable yardsticks for comparison but figures have not been sufficiently broken down to pinpoint operating and maintenance cost of individual trucking units. Cost charges haven't been properly assigned to either the truck or the mixer. Our procedures haven't always alerted us to the high upkeep offender. We still have a job to do on preventive maintenance forms and cost control.



Forms 8 and 8-A, *top and bottom are forms for equipment and depreciation records*

Cost Control System

A southern operator recently asked me to send him copies of the suggested preventive maintenance control forms. In his letter, this producer quipped that he guessed that operators in the South apparently hadn't caught up with developments in other parts of the country. Actually, one of the most complete preventive maintenance cost control systems that I have observed in our industry has been worked out by a Hollywood (Fla.) producer, Meekins, Inc.

This ready-mixed concrete company is headed by Clifton Meekins, president; Tom N. Kearns, vice-president; and Edward T. Foster, secretary and treasurer. Kenneth G. Turnbull is safety director and purchasing agent. The latter helped to set up the cost control system and continues to work closely with the cost accountants.

The Meekins organization has a complete set of cost control forms that, together with proper procedures and competent cost accounting personnel, gives this progressive Miami area concern effective control over operating and maintenance expense. In illustrating the use of their control forms, Charles P. Miller and George V. Degenkolb, the company's cost accountants (with the approval of Mr. Meekins and other key officials) worked out a complete sample for my study and use.

Ben Glaze, driver of a mixer truck, numbered 36M. reported (on form 1) that the pivot on chute jams and that the throwout collar on mixer motor was loose. Driver Glaze made this written report at the end of a working day before checking out.

Although Meekins Inc., maintains a sizeable parts inventory, the cost accountants carried out their complete sample case illustration by preparing a Material Requisition (see Form 2) made out to a Miami truck mixer distributor. The "parts" were "picked up" the next morning in a company service truck. The sample material requisition, signed by the head mechanic, was confirmed the next morning by a Purchase Order (see form 3) issued by a member of the purchasing department.

A combination work order and cost (material and labor) record (see form

(Continued on page 171)

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Cellular Concretes Featured at Autoclave Convention

• Autoclave Building Products Association draws record attendance at Buffalo, N. Y. meeting

THROUGH THE JOINT EFFORTS of the Autoclave Building Products Association officers, Fred Reinhold, president, Anchor Concrete Products Inc., host, and the many enthusiastic prospective autoclavers and suppliers of materials and equipment, the 49th convention marked the most widespread and keenest interest in high pressure steam curing shown to date. Nearly a hundred members and guests registered, and plans for enlarging the membership were discussed.

The preconvention "Get-Acquainted" session Sunday evening offered good fellowship for guests and their ladies, with entertainment provided through the courtesy of Fred Reinhold. Other entertainment included a trip to Niagara Falls on Tuesday.

Dale Cobb, president, opened the convention on Monday with the invocation by Rev. DeGraw and a welcome address by Hon. Elmer E. Lux, president of the City Council, Buffalo. All guests were transported by special buses to the Anchor Concrete Products plant where Fred Reinhold and staff explained the operation of the 10-ft. autoclaves and doors and the 108-block racks. Guests also inspected with interest the Flexicore and Stresscrete departments, and were treated to several cellular concrete demonstrations.

The main program opened with a summary of the Anchor plant tour by Fred Reinhold who answered another barrage of questions on its operation. Neil Hansen gave an illustrated talk on the "New Autoclave Installation" of the Zenith Concrete Products Co., Duluth, Minn. This was followed by the panel on "Equipment and Plant Design for Autoclaving" moderated by Ralph E. Cromis, chairman of the Concrete Products Division. The interest shown in this panel discussion and in the papers presented during the three days of the convention was so keen that they will be reported by subject classification in this and the June issue to give fuller coverage.

A session was devoted to a discussion of Cellular Products in Europe by R. C. Valore of the National Bureau of Standards, and in Canada by J. G. Ortengren of the Alberta Ytong Manufacturing Co. Dr. G. L. Kalousek of the Owens-Illinois Glass Co. discussed new theories on causes of shrinkage in concrete block.

The convention was concluded Wednesday with papers by Dr. W. C. Hansen, Chairman A.C.I. Committee 716, on activities in the field of Shrinkage measurements; by H. T. Williams of Standard Slag Co. on the use of expanded slag in concrete products; and by J. K. Selden, consultant on autoclaving, on "Turn-Key" or automatic autoclaving plants. An unexpected pleasure was added in the form of two colored films on cellular concrete in Europe by Mr. Lundgren of Siporex, Stockholm.

Preliminary plans for research were announced by W. O. Ferguson of Roanoke, Va., the new chairman of the Concrete Products Committee, who plans to invite a group to Roanoke soon to discuss the subject. The new chairman of the Sand Lime Products Committee will be announced shortly.

Re-elect Officers

All officers were re-elected for a new term as follows: president, Dale Cobb, sales manager of Masonry Products Division, Jackson Ready-Mix Concrete Co., Jackson, Miss.; vice-president, Leo J. Ryan, president of Ryan Builders Supplies, Ltd., Windsor, Ontario, Canada; and secretary-treasurer, Henry DeGeus, III, manager of Saginaw Brick Co., Saginaw, Mich.

The convention ended with expressions of a need for unity between all producers of autoclave products in the face of unified research and promotion achieved by the concrete masonry industry's competition.

Lightweight Cellular Products

Keen interest in foamed concretes or cellular silicates as one of the most glamorous products in the autoclaving field was assured during the tour of Anchor's plant when several Ytong floor and partition slabs specially shipped from Sweden for the purpose were displayed by J. G. Ortengren of Alberta Ytong, Ltd. One of them was loaded with blocks about 5 ft. or more in height. Tests with an acetylene torch showed the insulation and fire resisting properties.

Leo Rivkind of Mearle Manufacturing Co., Roselle Park, New Jersey, gave a demonstration of the foaming apparatus and the tough foam which is used in another type of cellular concrete and outlined its manufacturing advantages. Finally, Mr. Nixon, of National Foam Systems, Westchester, Penn., discussed briefly his equipment and system for producing foamed concretes and outlined their use without autoclaving in roof insulation.

Papers on cellular concretes and on shrinkage were presented. R. C. Valore of the National Bureau of Standards, led off with an illustrated talk on "Applications of Autoclaved Cellular Products in Europe." Pictures of mix-foamed, pre-formed-foamed and aluminum powder expanded cellular products were shown. Different colors were obtained with varying raw materials; such as, cement, lime, silica flour, fly ash, and burned oil shale. Autoclaved products gave compressive strengths of from 800 to 1200 p.s.i. for a 40 p.c.f. material, much higher than obtainable at the same density with ordinary curing.

Views were shown of the manufacture and erection of precast roof, wall and floor slabs made of the two competitive Swedish materials Ytong and Siporex, widely used throughout Europe and now being introduced into Canada and Mexico. Except for the experimental manufacture of Calsi-Crete, a pre-formed foam product, none of the autoclaved cellular materials appear to be available commercially in this country as yet, although several concerns are planning to enter the field. Mr. Valore, while emphasizing the potentiality of these 35-45-lb. structural insulating materials for the development of large prefabricated panels suitable for American construction methods, also cautioned against the assumption that anyone without adequate background or an organization without prior commercial experience could expect to produce these materials without many headaches. And even with manufacturing know-

how, years might be required to find the right raw materials, break through century-old building codes and prejudices, and establish these new products on the market.

Comparing the various manufacturing methods, the speaker noted that with care all the products would give substantially equal properties but that more precise control was required with the aluminum powder, hydrogen gas bubble method originally developed in this country in 1906, and commercially developed by various Swedish concerns, than with the preformed foam method used extensively by the Russians.

By way of reference, Mr. Valore cited his own rather comprehensive study of the whole field of cellular concretes and silicates which appeared in the May and June, 1954 Journals of the American Concrete Institute and are obtainable in reprint form.

Continuing on the subject of cellular silicates, J. G. Ortengren of the Alberta Ytong Manufacturing Co., Ltd., Calgary, Alberta, spoke on "Ytong, Present Canadian Developments." The reason for his enthusiasm for this autoclaved cellular product, the speaker explained, was that on a recent trip back to Sweden where Ytong originated, he found that a revolution in building methods had occurred. Since the war, homes built with lumber had dropped from 87 percent to only 10 percent and cellular building materials were becoming the almost universal material. Swedish building codes permit load bearing walls up to five stories high of cellular units testing 850 p.s.i. and one story dwellings of 250 p.s.i. material — thus providing excellent insulation. Popularity of this material is shown by the fact that Sweden, with a population of only seven and a half million produces 2900 cu. yd. of cellular products per day, or enough to build homes for a community of 125,000 every year. Production in European countries is higher than this and plants are steadily being added.

Convinced by a trip to Sweden, Mr. Ortengren and associates built a 28,000 sq. ft. Ytong plant at Calgary. A high-silica shale and lime are used, although many other materials could be used due to the flexibility of the process. (see ROCK PRODUCTS, April, 1955, page 122)

Plans for the United States are based on using the materials for roof slabs and other reinforced products rather than trying to compete with concrete masonry units. Two-inch slabs may also be made for insulating structural steel.

Commenting on Mr. Ortengren's claim that Ytong had substantially no moisture movement, Mr. Valore cited his own tests of Ytong and a cellular product made with similar raw materials. In drying from saturation the samples first shrank, then expanded, and then shrank a net total of only about 0.02 percent down to room dry condition, an exceptionally low value. To further validate his claims of volume stability, Mr. Ortengren then referred to an official inspection of the first Ytong building in Sweden which after 20 years showed no cracking inside or out. Excellent resistance to weathering was also shown by inspection of buildings in which Ytong was left exposed for over 20 years without harm. Ordinarily, however, the surface is stuccoed.

Mr. Valore, noting that Ytong uses only lime while its competitor Siporex uses only cement, suggested that a combination of cement and lime with suitable siliceous materials might have decided advantages. Such formulations are now being used in Israel and elsewhere.

Mr. Lundgren of International Siporex, Stockholm, stopped off unexpectedly on his trip from the Siporex plant in Mexico to the Siporex plant in Montreal. He showed two colored movies on the manufacture and use of Siporex in Sweden.

Siporex, like Ytong, can be cut, drilled, nailed, etc., like wood, and is made by a similar process in highly mechanized plants. The prepared slurry is poured into large molds and allowed to set until the hydrogen gas bubbles released by the aluminum powder cause the mass to rise until it fills the mold. After the cake, which may be 5 ft. x 20 ft. x 20 in. has set, the mold is opened by a push button and the cake is automatically sliced like butter in three dimensions with a wire cutter accurate to 1/48-in. The block or slabs are then autoclaved for 24 or 16 hr. (depending on the plant) to attain full strength. Unlike Ytong, Siporex is generally made from cement and ground sand rather than lime and shale, but other materials like fly ash and slag can be used.

Siporex plants have been built not only in Sweden, Denmark, Finland, and Norway, but also in Germany, France, Africa, South America, and now Canada and Mexico. The 70 percent reduction in weight of floor slabs is especially advantageous in Mexico City where buildings sink as much as 18 in. a year due to dead weight. Siporex plants have produced a total of nearly 100,000,000 sq. ft. of roof and floor slabs in Europe.

The second colored movie depicted Swedish construction methods with Siporex. Comments, questions, and answers continued as before, including the following:

The three competitive cellular silicate products, Siporex, Ytong, and Durox, have been so successful that now 60 percent of all construction is in cellular units, 30 percent brick, and 10 percent block or wood.

Two-thirds of all flat roofs are now Siporex, only one-third being concrete or wood. Emphasis is on large sized sections to save labor. Partition slabs are 3 in. thick, 20 in. wide and story height. Beams have been made up to 40 ft. long. Wall panels have been very successful and can be made in Canada for half the cost of American insulated concrete panels. A popular wall construction in Sweden uses 4 in. thick cellular 25 p.c.f. insulating blocks for an outside form against which ordinary concrete is poured inside.

Precast wall and partition slabs are erected rapidly by common labor with the aid of aligning clips, floor slots, and special cement grouts and elastic mortars. Joints are so smooth walls can be papered direct over ordinary sizing. Roof slabs are made up to 20 ft. long, generally of 31 p.c.f. material, giving light weight and "U" values without separate insulation of around .15 for 6 in. thick.

Of special interest were the pictures of four men erecting a small dwelling in three days out of pre-cut Siporex slabs. With grooved edges, numbered pieces, and special construction methods, these houses are erected by the hundred at a saving of 15 to 20 percent over ordinary commercial materials in Europe. Several hundred are to be built in Montreal this year.

Wall thicknesses vary from 4 in. in Mexico to as much as 10 in. in arctic Sweden and are painted outside and in. The volume of this 31 p.c.f. material makes this construction possible.

Shrinkage of Concrete Units

Dr. George L. Kalousek, chemistry section, Owens-Illinois, Technical Center, Toledo, Ohio, gave an informal advance report on some basic research he is conducting on the effect of combined and adsorbed water on the layer structure of various calcium silicate crystals and the relation of this water to the shrinkage of products made from the materials. Due to the fact this subject will be covered in an article by him to be published shortly in the A.C.I. Journal, he requested that details of his talk should not be reported at this time. Dr. Kalousek also commented on the valuable research work being sponsored by W. D. Ferguson in Virginia and at the University of Toledo, some of the results of which have already been turned over to A.C.I. Committee 716.

Dr. W. C. Hansen, chairman Re-

(Continued on page 165)

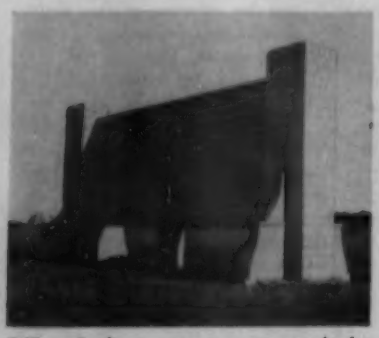
Showing how concrete masonry billboard is used. Billboard is placed at right angles to highway with an advertising message on both sides

Durable Outdoor Billboards of Concrete Block

By PORTER V. TAYLOR

OUTDOOR ADVERTISING along highways has changed little during the entire twentieth century. The wooden billboards used for most outdoor advertising were familiar sights in our childhood and about the only change in the past 50 years has been the copy. However, the traditional wooden signs have always had certain drawbacks, such as damage by brush fires, vandalism, and high winds. The latter have been a serious problem in Florida and other windstorm areas. When hurricane warnings go up, crews of workmen may be seen busily engaged in dismantling signs to store until storm danger passes. Needless to say, this is an expensive operation requiring hours of labor. Then there is the period of lost time while new bills are posted after the signs are reassembled.

When Ponce De Leon Springs, near Deland, Fla., decided to embark on a statewide publicity campaign, the billboard situation was studied and it was decided to design something better. The new sign is a permanent structure of concrete block with a reinforced foundation 3 ft. deep. These concrete block signs are almost indestructible, and are not subject to hazards of hurricanes, brush fires, gunshot, rust, or peeling. Block are treated with waterproof compounds to prevent peeling of lettering. Over this is placed a coat of Portland cement paint. After this treatment, lettering may be placed directly on sign without deterioration. Permanent advertisements by the owner usually are applied in this manner. The reverse side of the sign is rented to other advertisers, and a removable pressed board panel is used for that side. This is fastened with a special steel pin which is fired through the panel into the concrete with a tool similar to an air gun.



Billboard of concrete masonry ready for final weatherproofing and lettering

This pin is threaded on the inside and a small washer is held over the outside edge of the sign with a screw into the pin. This makes the panel easily removable, and also permits it to expand or contract with temperature changes.

Signs are being erected by contractors in various sections of the state. Fields & Hiers of Lake City and Cast-O-Stone of Daytona Beach have built most of those already completed.

Because of the relatively permanent nature of these structures, land is leased for a five-year period with options to renew in additional five-year periods.

These signs will probably appear in much larger numbers because C. Hayden Davis, one of the developers, has formed a new corporation, D.H.& D. Outdoor Displays, for the purpose of marketing signs to the general advertising public.

Concrete Principles

A series of articles, discussing the fundamental principles of "Concrete Batching and Mixing," has been published in booklet form by C. S. Johnson Co. of Champaign, Ill. The history of "concreting" for all types of structures and surfaces up to the present time is discussed. Also included are: equipment selection, its application and maintenance; and production factors and job engineering. The 44-page booklet is divided into eight chapters and deals with portable and semi-portable batching plants, single and multiple materials batchers, weigh-beam and scale adjustments, highway, airport and ready-mixed concrete plants, permanent plant facilities and controls for large, mass concrete plants.

Executive Secretary

BYRON D. OSTERLOH of Omaha, Neb., has been appointed executive secretary and research engineer of the Nebraska Concrete Masonry Association. A graduate of the University of Nebraska with a B.S. degree in architectural engineering, Mr. Osterloh has served as a naval architect at the Pearl Harbor, T. H., Naval Shipyard, and has been a structural and architectural engineer with the Omaha Public Power District and the Union Pacific Railroad. In addition to servicing members of the Nebraska Concrete Masonry Association, he will also serve as consultant for builders and architects using concrete masonry in their designs.

Byron D. Osterloh

Autoclave Meeting

(Continued from page 163)

search Laboratories, Universal Atlas Cement Co., Gary, Ind., and chairman of Committee 716 of the A.C.I. on high pressure steam curing, gave a report of the activities of his committee. The basic effort is still the study of the physical properties of autoclaved products, especially volume change characteristics and practical methods of test for the same which can be used by specification writing bodies. Reviewing the methods already studied, it was observed that the Reference Method-drying at 73 deg. F. over sodium hydroxide for a month — gave the most reliable values but was too slow to provide a basis for commercial testing. The British Method, drying at 122 deg. F. (50 deg. C.) over calcium chloride, while giving fair results in two weeks or less, requires very careful control. The Rapid Method, drying in an electric oven for two days at 225 deg. F. is the only one simple and fast enough to hold out any promise of commercial acceptance, but the results appear to be less reliable and may fail to provide a sufficiently clear basis of distinction between various curing methods. Studies are now being conducted, therefore, to determine the effect of more precise control of moisture content and temperature of the drying oven and the effect of CO_2 content of the drying atmosphere on shrinkage curves.

Guests were invited to attend the next meeting of the committee, which will probably be held at the time of the A.S.T.M. convention this summer.

Papers on plant and equipment know-how, and on product quality control will be discussed in the June issue.

Patching Concrete

A SOLUTION of polyvinylacetate, both as a primer on the old concrete and as an admixture to the patching mortar, is claimed to produce a patch which will give excellent service. An article on this subject appeared in *Zement-Kalk-Gips*, Vol. 4, p. 101 (1953). However, the marked weakening effect water has on mortar containing the resin is omitted.

Bridge Section Contract

KATTERJOHN CONCRETE PRODUCTS Co., Owensboro, Ky., has been contracted by the Kentucky State Department of Highways to furnish concrete bridge sections to replace small bridges that have been washed out by floods, collapse, etc. The firm had the low bid of $107,160, and will furnish precast sections 30 and 20 ft. long, and 3 ft. wide.

Before You Buy Just ANY Shovel Crane . . .

CHECK THESE 2 NEW BANTAMS!

You Get **MORE POWER . . . SMOOTHER PERFORMANCE . . .**

. . . ADVANCED ENGINEERING!

C-35A CRAWLER BANTAM is the lowest priced ¾-yd. Crawler in the industry! Features 2-speed, independent travel; 94" overall width; low ground bearing pressure; 9 fast-change attachments!

T-35A CARRIER MOUNTED BANTAM — fast, efficient! Lifts 12,000 lbs.; works with 9 fast-change attachments. Complete line of BANTAM-BUILT Crane Carriers includes Model 100, All New 6 x 4; Model 200, 6 x 6; Model 300, Heavy-Duty 6 x 6 Carrier!

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- ★ **NEW** Heavy Duty Vertical Swing Shaft
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IMPROVED OVER 5800 BUILT AND SOLD

CLIP . . . Mail TODAY for more information about the NEW BANTAMS

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216 PARK ST., WAVERLY, IOWA, U. S. A.

Please send details on the

☐ Crawler mounted C-35A
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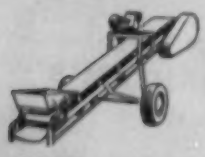
WILLARD Weigh-Batch Loader



WILLARD Mixer Loading Conveyor

WILLARD Truck Mixer

GET MORE DONE with less expense with Willard portables like the typical company shown above. Their fast-operating spread consists of self-loading Weigh-Batcher, Mixer Loading Conveyor and two Truck Mixers . . . all bought for a fraction of the cost of a big stationary plant. Only two drivers, a batcher man and a dispatcher are needed.

You take Willards right to the project for maximum efficiency . . . using multiple stock piled aggregates and bulk cement for specification concrete. Moving to a new location requires no effort beyond digging a shallow pit for the foot of the conveyor. The "Willard Way" is the time-saving way!

"Wheel the right mix at the right time at the right cost to the right place with Willards."

WRITE FOR THE "WILLARD WAY" BOOKLET

Manufactured in Los Angeles and Galion, Ohio

WILLARD CONCRETE MACHINERY SALES CO.

11700 Wright Road, Lynwood (Los Angeles County), Calif.

Member T. M. M. B.

READY MIX *"the Willard Way"*

Single Supply System

(Continued from page 153)

A Besser Vibrapac block machine is used in the block plant. It can produce blocks in sizes 8- x 8- x 16-in., 8- x 8- x 8-in., 4- x 8- x 16-in., and 12- x 8- x 16-in. A Universal concrete pipe machine is used in the pipe plant and can turn out A.S.T.M. and Florida State Road Department specification reinforced concrete tongue-and-groove pipe from 12 to 60 in. inside diameter.

Two men only are required to operate the conveyor storage and supply system. A central control board has been placed at the exit end of the tunnel beneath the stockpiles. One man operates all of the conveyors in the system. The operators of the ready-mix, block and pipe plants signal their material needs by an intercommunication system. Another man is employed opening the hand-operated feeder gates beneath the stockpiles, as directed by the conveyor control operator.

The products of Pinellas Industries are widely used in the St. Petersburg-Tampa area and, in addition, are shipped by rail and truck throughout the West Coast Florida area.

Prize Winning Concrete Homes

THE NORTH CAROLINA CONCRETE MASONRY ASSOCIATION has published a booklet entitled, "Prize Winning Concrete Masonry Homes Designed for Modern Living," illustrating 20 model home designs, including 10 prize winning designs from its recent competition, in which it offered $3100 in prizes for the best design of a concrete masonry home, with accent on modern living. Specifications for the home were: three bedrooms, for a climate similar to that of North Carolina; living area not to exceed 1350 sq. ft.; lot approximately 75 x 150 ft.; and interiors of exposed concrete masonry. The booklet, costing 25¢, is available from the association at 1411 Insurance Bldg., Raleigh, N. C.

OSWALT

THE WORLD'S NEWEST BLOCK MACHINE

NEW HIGH CAPACITY without sacrifice of Quality!

The OSWALT Block Machine can run at unusually high speeds . . . maintain peak production records for any given aggregate . . . produce premium blocks meeting all specifications. It's designed and built throughout for longer life and better service.

Ask about our Package Deal for building this machine in your own plant.

COMPLETE WITH OSWALT SERVICES!

IMPROVED VIBRATION and special cam design boost output to maximum without sacrifice of quality.
NEW SIMPLIFIED HEIGHT AND DENSITY CONTROL automatically maintains block uniformity.
HEAVY DUTY SHOCK-FREE BLOCK EJECTOR AND FRONT END PALLET FEEDER increase production efficiency.

Visit our new plant to see the OSWALT Block Machine in operation.

OSWALT ENGINEERING SERVICE CORP. 1335 Circle Ave., Forest Park, Ill. Phones: Elsebrook 8-3666, FOrest 6-3898

Concrete Pipe Convention

(Continued from page 155)

and designs for new usage, he said. He discussed some of these matters and made suggestions based on experi-

Miles N. Clair, president, The Thompson & Lichtner Co., Inc., Brookline, Mass.

ence with use, design, manufacture, specifications, inspection and testing of concrete pipe.

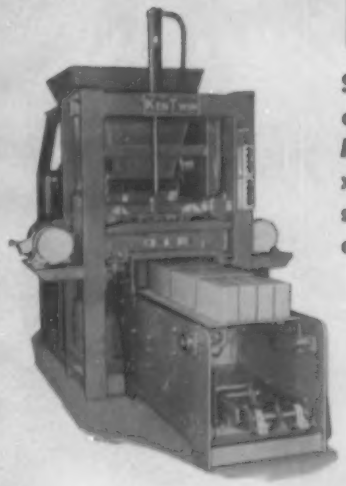
Mr. Clair stated that structural failure normally resulted from inadequate plans and specifications due to lack of proper consideration by the designing engineer of local conditions or by improper installation of the pipe by the contractor. He pointed out the inconsistencies or vague statements that are in some of the specifications for bedding and backfilling. He suggested that the American Concrete Pipe Association manufacturers should cooperate with technical societies in the development of specifications for installation and use of pipe that will give proper recognition to new developments in soil mechanics and construction methods.

Some emphasis was placed by Mr. Clair on the subject of curing. He suggested that the specifications be consistent in requiring certain curing methods, and also suggested that membrane curing be allowed in the existing specifications. He said that he would prefer to see cores used to determine the strength of the concrete and the absorption of the specimen in order to maintain consistent results and to determine the strength of the actual concrete in the wall of the pipe.

Rhode Island Sewer Project

The paper entitled "The Rhode Island Blackstone Valley Intercepting Sewer Project" was presented by Francis A. Obert, project engineer from Metcalf & Eddy, Consulting Engineers of Boston, Massachusetts. Mr. Obert carried the story on this project from

The *NEW* KENT AUTOMATIC FRONT PALLET RETURN



Saves Labor... Steps up Production... Available for *All Pallet Sizes* down to 18" x 18"... Low in Cost! Installed on any KENTWIN on the job today, anywhere.

The availability of the new Kent Automatic Front Pallet Return in a range of sizes to fit all pallets is welcome news to block plant owners everywhere.

Reasonably priced on a comparative basis it has been skillfully engineered and built for smooth, foolproof operation. Pallets are returned directly to the front of the machine.

Easily removable from the block machine, it incorporates no extra motors or controls, but is driven by the hydraulic cylinder on the KENTWIN. Thus the unit is synchronized with the operational cycle of your block machine.

A KENTWIN equipped with a new front pallet return becomes a "one man blockmaker."

Consider the profit possibilities with a new pallet-return-equipped KENTWIN or an automatic return on your present KENTWIN.

You'll want the complete story of this remarkable development. *Write Today for Literature, Prices and Complete Details.*

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A PURE SYNTHETIC IRON OXIDE

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Brilliant — Light-Fast — Extra Strong Red Oxide of Salmon Shade

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Working samples upon request

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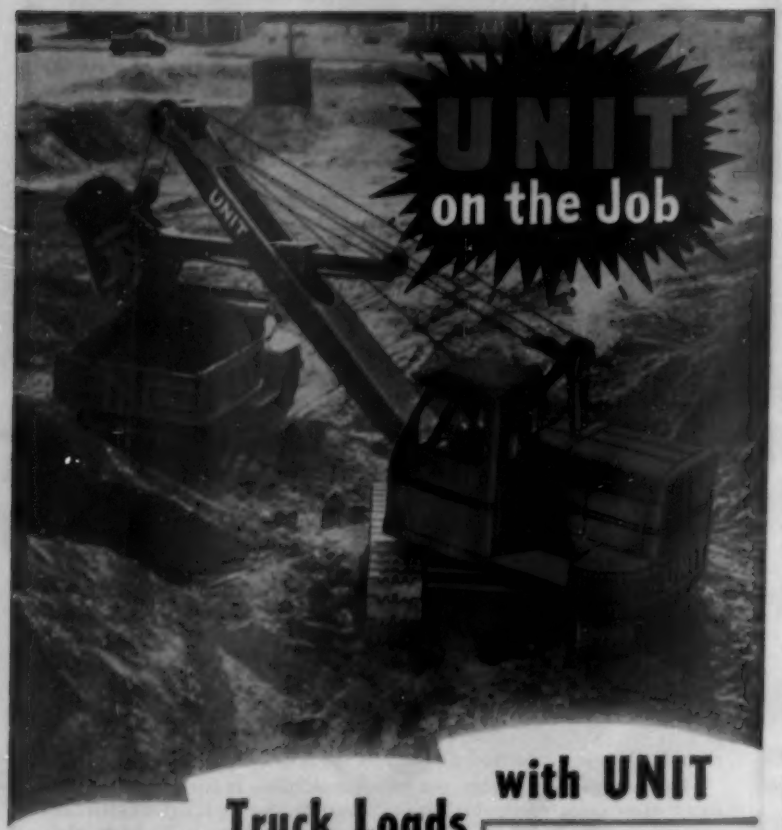

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Here's a UNIT ¾ yard Shovel that's "in there swinging" . . . making big payloads. UNIT'S balanced stability and power permit hard digging . . . produce maximum yardage at low operating cost. Fewer working parts cut down replacements required . . . reduce maintenance costs. The FULL VISION CAB enables operator to see in ALL directions . . . promotes safety . . . increases efficiency. Results in more loads per day and easier load handling. Get the complete UNIT story. Write for literature.

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CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL

All Models Convertible to ALL Attachments!

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its early conception to the present day. He pointed out that Rhode Island ranks 36 among the states in population, but ranks first in population density with about 652 persons per square mile. After a considerable number of years of planning and discarding plans, a bill was introduced to the House of Representatives of Rhode Island on March 3, 1947 calling for a pollution abatement program in the Blackstone Valley. A little less than six months later the bill had been passed and a Commission organized with the authority to spend $5,000,000. Metcalf & Eddy was chosen from among 30 engineering firms submitting letters of interest.

The design of the system was based on the conditions expected to prevail for about 50 years or to the year 2000. There are three interceptors being constructed; one will be about seven miles long with a largest diameter of 7 ft. 6 in.; another, will be three miles long with 48-in. maximum diameter and the third, will be about two miles long with 48-in. as the maximum diameter. In the first two, the sewage will flow by gravity and in the third, a part of the flow will be pumped. Mr. Obert stated that a total of eight construction contracts for gravity interceptors have been executed. Five have been completed and the sewers are now in use. The total cost of the construction of these projects will be about $6,200,000, and it is expected that it will be completed in the early part of 1957. A 48-in. diameter pipe is being installed in a tunnel about 5000 ft. in length with its deepest point about 135 ft. below the ground surface. Manholes 75 ft. deep will be constructed at each change of direction. The lower 55 ft. will be poured in place against rock and the upper 20 ft. will be precast concrete pipe.

A triple barreled pipe will be used to cross the Seekonk River, a navigable tidal stream, Mr. Obert said. It consists of 16-in., 48-in., and 30-in. lines, and will serve an estimated population of 56,000 persons.

The total length of sewers for the ten contracts is approximately 69,000 lin. ft. of which about 55,000 ft. will be precast-concrete pipe in diameters varying from 15-in. to 60-in. Mr. Obert said.

Concrete Technology

Herman G. Protze, consulting technologist on concrete, concrete products, and construction materials, from Boston, Mass., presented a paper entitled "Concrete Technology As Applied To The Manufacture Of Various Types Of Concrete Pipe." In Mr. Protze's words his paper dealt with the "homlier aspects of the manufac-

ture of concrete pipe." He stated that major variations in the quality of the *basic* constituents can affect the quality of the resultant product by an unpredictability of as much as 25 percent. He suggested that manufacturers first explore the better control of the basic constituents in concrete before spending excessive time and money on refinement of extraneous variations which may affect the end product only 10 percent as much as the former.

Mr. Protze said that it had been found desirable to develop a 24-hr. proof test for classification of cement quality (as regards strength) in each car shipped. He described the test as one which gives credit to those cements which require less water and penalizes those which require more water, or which show flash setting tendencies. He said that the test also brings out strength reduction that may be occasioned by excessive air-entraining tendencies in the cement. The test essentially consists of preparing a wet mixture of concrete and maintaining a certain consistency over half-hour period.

Mr. Protze discussed the characteristic of cement known as bleeding. He emphasized its importance in machine made pipe and centrifugated pipe. He described a bleeding test based on the relative heights of supernatent water and settled paste in a prepared mixture.

Mr. Protze discussed aggregates and the fact that various manufacturers in different parts of the country can make excellent pipe using fine mason sand and limestone coarse aggregate in Miami, coarse masons sand and poorly graded crushed granite in New Jersey or uniformly well graded concrete sand and perfectly graded sub-⅝-in. crushed stone and pea gravel in New England. He emphasized the importance of using the best aggregates available, and in controlling their proportioning and uniformity of gradation and cleanliness within reasonably rigid limits.

Once the optimum fineness modulus for an aggregate of a given type is established, Mr. Protze said, it is important to maintain that quality within a very narrow range. The fineness modulus of the coarse and fine aggregates individually should be maintained within ± 0.10 and the gradation on each sieve within 2 percent of the average optimum, whereas the weighted average fineness modulus of the blended aggregates should be maintained within ± 0.05. He said with this type of control, the excess cement which is often put into concrete pipe mixtures can be maintained at a minimum factor of safety and can result in savings up to two or more sacks of

(Continued on page 170)

Noted operators in Ready Mixed Concrete turn to...

The new ROCKET

GOELLNER, HAYDEN, MAULE, QUILLIAN, NELCH, SCHILLING —DOZENS MORE!

Many well-known producers of ready mixed concrete such as Goellner, Hayden, Maule, Nelch, Quillian, Schilling, and numerous others, have all tried the new Rocket, and have voiced their approval with re-orders. Their reasons are plain enough. First, they like Concrete Transport Mixer Company's policy of dealing direct with the customer, enabling him to buy a high-quality, light-weight mixer for considerably *less* than other makes. Then too, they like the simplified design—no complicated mechanisms to add weight and increase cost. These are the men who attribute much of their success to rugged, dependable equipment—obtainable at exceptionally reasonable prices. Their endorsement is staunch testimonial to the high quality of products manufactured and guaranteed by Concrete Transport Mixer Company.

LOOK AT THESE FEATURES!

Deep-Cut Chute for fast discharge.

Hydraulic Chute Control makes the operator's job much easier, eliminates man-handling entirely!

Standard Industrial Engines truck-type transmission—service available at any automobile repair shop.

Three-Point Suspension cuts friction to minimum.

Wear Points constructed of tough, abrasion-resistant steel!

Operating Controls Grouped for ease of operation, accurately controlled discharge.

Positive Chain Drive delivers flexible power, not affected by road shock, twisting of truck.

Removable Inspection Hatch with leak-proof gasket!

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Gentlemen: Please rush me complete prices, literature, and terms on the following:

☐ New Rocket Revolving Drum Truck Mixer
☐ Hi-Lo Stationary Drum Truck Mixer
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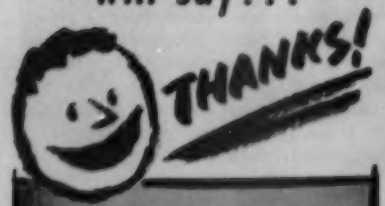

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DIFFERENT CEMENT & MORTAR COLORS

Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

CEMENT COLORS BY WILLIAMS

Here you have a choice of 18 shades —6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

MORTAR COLORS BY WILLIAMS

Here you have a choice of 5 different shades — one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.

Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO.
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cement per cubic yard of concrete produced.

Mr. Protze advocated the use of the Kelly ball for determining the consistency of concrete mixes of the wet type. He suggested a small vibrating mechanism which he described for the dry tamp concrete. Admixtures which were discussed by Mr. Protze included air-entraining agents, calcium chloride, fly-ash and dispersion and retarding agents. The subjects of consolidating the concrete mass and of proper curing completed Mr. Protze's presentation.

An interesting paper was delivered to the convention at a luncheon session by Dr. J. Elliott Janney, on "The Growth and Development of Owner Managers." Dr. Janney is a partner in the firm of Rohrer, Hibler & Replogle, Psychological Consultants to Management. He cited many examples of proper and improper management and development of personnel to take over management positions.

Conventioneers enjoyed a shore dinner party with dancing at Hugo's Lighthouse in Cohasset on the opening evening of the meeting. This affair was sponsored by the local concrete pipe manufacturers in the Boston area.

Hydrogen Sulphide Problem

The final afternoon of the convention was taken up by an industry "Jam Session." The earlier part of this discussion consisted of a talk by Dr. Richard D. Pomeroy, engineering consultant from California on the subject of prevention of hydrogen sulfide generation in sewers. Dr. Pomeroy discussed the many ways that pipelines can be prevented from becoming "septic tanks" in which deadly hydrogen sulfide is produced and he discussed some of the limiting criteria which should be used in designing sewers to prevent such generation.

The American Concrete Pipe Asso-

Dr. Richard C. Pomeroy, civil and chemical engineering consultant, Pasadena, Calif.

E. F. Bespalow, vice-president of Choctaw, Inc., who was elected vice-president of the association, giving a report of the Technical Problems Committee

ciation announced that it will hold its 1956 convention and meeting in Denver, Colo., toward the end of February or early in March of that year.

Prestressed Concrete Meeting

THE PRESTRESSED CONCRETE INSTITUTE, at its third monthly meeting in Leesburg, Fla., revealed plans for the first three basic projects to be undertaken by the newly organized group.

The first project will be to develop standard prestressing specifications which will be available to architects and engineers. The second project will be to conduct a full-scale fire test of building floors and roofs made of standard prestressed concrete roof and floor slabs. The third project planned is the standardization of bridge beam sections. Some other future projects will include a standardization of various prestressed concrete products such as T roof and floor slabs, channel slabs, foundation piling, wall sections, and others. The institute also plans to conduct a research program on the use of lightweight aggregates for prestressed concrete.

Members of the Prestressed Concrete Institute include producers of pretensioned as well as postensioned concrete, both from central casting yards and job-site casting. Officers of the group are as follows: Douglas Cone, Florida Prestressed Concrete Co., Inc., Tampa, Fla., president; George Ford, R. H. Wright & Son, Fort Lauderdale, Fla., vice-president; and Harry H. Edwards, Lakeland Engineering Association, Inc., Lakeland, Fla., secretary-treasurer.

•

WELLS BRIKCRETE COMPANY, Mahomet, Ill., has been licensed to manufacture and sell Brikcrete concrete block. Plant capacity is 2000 8-in. units, or 4000 4-in. units.

Cost Control System

(Continued from page 160)

4) was issued to the company garage. The same form is used whenever it is necessary to send a unit to a commercial garage for outside repairs (not a frequent occurrence at Meekins). Checking with the dispatcher, it was decided that the mixer truck operated by Ben Glaze could be spared for several hours around noon of that day. To hold downtime to a minimum, three garage men were assigned to the truck and the work, including the installation of a recapped tire, was completed in 1.3 hr. The daily log card (see form 5) shows that this truck was garaged for repairs from 11:00 a.m. to 12:30 p.m. during which time the driver had eaten his lunch.

In spite of the 1½ hr. garage downtime, the daily log card shows that this driver's truck made 6 trips delivering 42 cu. yd. in 11 working hours, including washout time and lunch hour (Meekins does not deduct for lunch hour — when time is important, drivers eat on the run).

The work order, which also serves as a cost record on labor and materials shows a labor charge of $9.80, a parts charge of $21.19, a recapping charge of $21.83 and a tax charge of $0.64.

Cost accountants take these charges and apply them against Driver Glaze's truck No. 36M. This work is done on the Daily Motor Truck Operating Record (see form 6.). Entries are made on two records, as a separate form is maintained for both the truck and the mixer. Recapping charges are made against the truck and the remaining charges against the mixer. This record gives a complete monthly picture on operating data and expense charges.

The listed operating data includes speedometer readings — at beginning and end of month; number of trips daily and monthly total, number of cubic yards delivered daily and total for month and actual number of truck operating hours by day and monthly total.

The expense record shows daily and monthly gas and oil consumption, including daily costs and monthly totals, grease charges, tire expense and all charges against the unit for parts and labor. Fixed costs, including pro-rated monthly charges on truck license and insurance are also listed.

At the end of each month, this operating data and cost information is entered on the yearly Motor Vehicle Cost Record (see form 7); again, one for each truck and mixer. With proper entries made, the accountants, by comparing operating and maintenance charge totals against cubic yards totals, are able to quickly and accurately

ATTENTION...
CONCRETE PIPE MANUFACTURERS

Are you using just tamper sticks when you should be using Irwin Rock Maple* Tamper Bars? Is frequent stick breakage robbing you of precious production time and material? Here's your answer. IRWIN ROCK MAPLE* TAMPER BARS.

Rock maple is the hardest, toughest, close grained hardwood grown in commercial quantities. And Irwin uses only selected rock maple that's straight grained the full length of the bar. Then we season it correctly to increase its toughness and service life.

Whatever your requirements, there's an Irwin Rock Maple Tamper Bar cut to your particular specifications. Just write and tell us what they are -- we'd be happy to send a sample immediately.

Write or Phone Today

*Northern Sugar Maple

IRWIN MANUFACTURING COMPANY
Garland, Pennsylvania

ROCK PRODUCTS
THE
Recognized Authority
OF THE
Non-Metallic
Minerals Industry

establish costs per cubic yard: by comparing expense totals against total miles, get costs per mile; and by comparing the same expense totals against total operating hours, establish costs per hour figures for each truck and mixer.

The final form used in the Meekins cost control system is the Equipment and Depreciation Record (see form 8); which lists the complete history of each truck and mixer, including both annual operating data and cost figures. On the truck card is listed such information as the make, year and model of the unit, serial and engine number, size of tires, weight when empty, date acquired, from whom purchased, original cost and extra costs involved in fishplating truck frame and changing to larger size tires, depreciation rate, monthly depreciation figure, estimated salvage value, gear ratio, wheel base and special information on truck equipment including make and model of distributor, carburetor, fuel pump, starter, etc. Similar information is listed on the mixer card. On the back side of the form, the unit's history record, by years, is shown, listing fixed costs including depreciation, license expense, and insurance charges and yearly variable operating and maintenance cost totals. This record enables a company official to tell at a glance, what each truck and mixer cost annually to own per cubic yard, per hour and per mile.

Meekins, Inc. cost accountants attach greatest significance to costs per mile. They use this cost yardstick to rate driver efficiency and mixer truck performance. They study this control record to determine need for overhaul or major repairs and when to replace high upkeep equipment. They use cost per mile information in deciding what makes and models to order when they purchase new trucks and mixers.

This company's accountants advised me that in evaluating equipment cost figures, a quarterly experience is a better, more dependable indicator than any monthly result. They pointed out that a great increase or decrease in sales volume or a sizeable replacement expense might cast an erroneous conclusion if only a month's report is used in arriving at a decision. They suggested that such incidents might show a cubic yard monthly "burden" variation as high as $1.50 against a quarterly difference of perhaps only 25 cents per cu. yd.

This company's efficient cost control system would be ineffective unless backed up by other essentials of a sound preventive maintenance program. It was apparent that this company had provided the important essentials. Truck and mixer equipment had been carefully selected. All delivery equipment was being regularly lubricated and otherwise serviced. Dual tires were well matched. A key maintenance employe was responsible for all greasing and tire care. Road calls were being held to a minimum. Off road trouble, due to sandy conditions, was being avoided through the use of matting to give the trucks necessary traction. Drivers were interested in their work as proved by the appearance of their trucks and mixers—both of which were painted a colorful red. A regularly scheduled safety meeting was planned for the evening following our second visit to the Meekins operation. This meeting was to be held in an attractive room specially provided for the holding of such affairs. In operations, maintenance and cost control, it was evident that this company was employing competent personnel.

This company stresses the importance of driver responsibility and a most careful check is made on tire performance. A driver is placed in charge of a truck and held accountable for its operation. Tires are definitely assigned to a given truck and remain on that unit until discarded. A complete case record showing repairs, recapping and use is maintained for each individual tire. Truck advertising and numbering are handled through the use of attractive porcelain panels. The trucks make a fine appearance on the streets and effectively advertise the company on their jobs. Deliveries are closely controlled by an effective dispatching system supported by the use of two-way radio.

The people at Meekins know what they are doing. They know when to send in trucks and mixers for servicing, major repairs and overhauls. Their cost figures tell them when to get rid of the old landmarks. Individual accurate records spot high upkeep equipment and pinpoint out of line costs. Alert, progressive, cost-conscious producers can be found in the South as well as in all other sections.

Add a New Profit-Maker
increase your volume
PRODUCE CONCRETE JOISTS, LINTELS AND FENCE POSTS with the KIRK & BLUM HEAVY DUTY VIBRATING TABLE
Your experience in the building trade should make it easy to build up a profitable business in this new line. The products are simple to make, have unusual strength, are termite proof. The KIRK & BLUM Type "S" Heavy Duty Vibrating Table is capable of multi-production of concrete joists, allowing a fine profit-margin. Easily produced by unskilled operators. For complete details and prices, write to The Kirk & Blum Mfg. Co., 3210 Forrer Street, Cincinnati 9, Ohio.
Only Small Investment Required!
The Kirk & Blum Vibrating Table requires a small initial cost, lets you make an entirely new line of 8", 10" and 12" joists in 20 and 24 ft. lengths.
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Manufacturers of steel forms of all types . . . Curb, Gutter, Sewer, Road

Masonry Unit Standards

AMERICAN SOCIETY FOR TESTING MATERIALS Committee C-15 on Manufactured Masonry Units, considered several new fields of standardization and reviewed the status of existing standards at its meeting February 2, at Cincinnati, Ohio. A subcommittee on Waterproofing Materials for Unit Masonry Walls was formed to consider suggested methods of testing; the relationship to other factors, such as the effect of water or moisture from other than exterior sources; and to define by title the function of the subcommittee.

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* Advances architectural design and beauty

* BOOSTS YOUR PROFITS!

+ Add a BES-STONE BLOCK SPLITTER to your plant NOW

You'll find it full of profit-opportunity because the trend toward BES-STONE Split Block is strong! Architects, contractors, owners WANT this beautiful, modern, colorful "quarried stone" effect that is so ideal for all structures . . . commercial, institutional, residential. BES-STONE Block Splitter makes straight line cuts . . . no cull block. Automatic hydraulic operation . . . up to 960 Split Block per hour . . . safe, quiet . . . a big money maker!

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Automatic operation — 960 Split Block per Hour

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BESSER COMPANY • Complete Equipment for Concrete Block Plants • Alpena, Michigan, U. S. A.

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LOWERS BLOCKS INTO BASEMENTS AND UNLOADS ON BOTH SIDES AND REAR

We design the fork to handle your present size cubes—you don't have to change your cubing set-up. Hauls full-capacity loads up to 864—8″ x 8″ x 16″ blocks.

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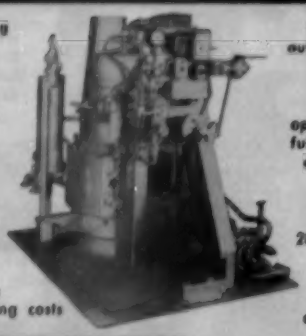
Get
STEAM QUICK with "Kwik-Steam"
(IN 2 MINUTES)
for curing Blocks and Pipe
with the Littleford
"KWIK-STEAM" Vapor-Clarkson Generator



Modulating controls
fully automatic
steam where you want it
operates at full or half capacity
steam when you want it
sizes from 20 to 165 BHP
cuts manufacturing costs
speeds up curing cycle

You get steam in 2 minutes flat from a cold start with the Littleford "Kwik Steam" Generators. And you save real money on concrete manufacturing costs, because the "Kwik-Steam" reduces labor costs 50% (no skilled labor required), and speeds up the curing cycle. There's a size for your plant. Send for descriptive bulletin.

Send for Bulletin EE-22

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The Backbone of STEEL
for EVERY masonry wall!

modern Dur-O-waL reinforcing wins the praise of the man with the trowel. Dur-O-waL lays flat . . . works fast . . . handles easily.

● Genuine Dur-O-waL is electrically welded of high tensile steel; trussed design assures horizontal and vertical reinforcing for block, brick and tile walls. Assure lasting beauty with time-tested Dur-O-waL . . . available everywhere. Insist on Dur-O-waL.

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Now — You can add to your profits by supplying customers with Soffit Block for floors and roofs, in addition to Vibrapac Block for walls. Soffit Block floors are permanent and fireproof. They form an ideal base for installing heating coils for radiant heat jobs. The textured and patterned ceiling has maximum acoustical and insulation values . . . can be plastered, if desired.

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The same machine that makes high quality wall block, also produces Soffit Block, using the same set of Plain Pallets.

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ALPENA, MICHIGAN, U. S. A.
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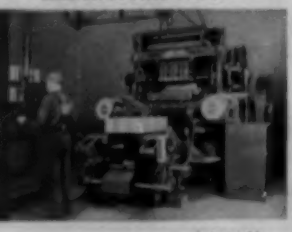
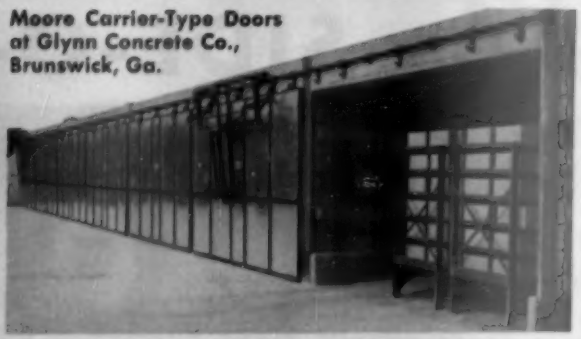


Moore Carrier-Type Doors at Glynn Concrete Co., Brunswick, Ga.



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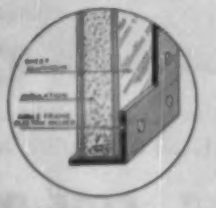
Save Fuel—Reduce Curing Time



Keep heat where it belongs—inside the kiln—with Moore Aluminum-Insulated Doors. They improve curing conditions — save steam—last longer.

Send us dimensions of present door openings for quotation.

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Oldest and Largest Manufacturers of Lumber and Veneer Dryers
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WHERE AISLE SPACE IS LIMITED STANDARD sliding doors need no aisle space. The carrier-type door (shown) requires 15" minimum clearance above top of door opening. A vertical sliding door, counterweighted for easy opening, is also available.

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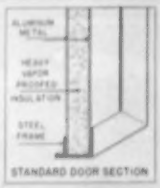

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- ___Admixtures, Aggregate
- ___Aftercoolers, Air
- ___Agitators*
- ___Aggregates (special)*
- ___Air Compressors
- ___Air Separators
- ___Asphalt Mixing Plants
- ___Bagging Machines
- ___Bags*
- ___Barges
- ___Batchers
- ___Belting, Conveyor, Elevator, Power Transmission*
- ___Belt Repair Equipment
- ___Bin Level Indicators
- ___Bins and Batching Equipment
- ___Bits*
- ___Blasting Supplies
- ___Block Machines,* Concrete Building
- ___Bodies, Trailer*
- ___Brick Machines and Molds
- ___Buckets*
- ___Bulk Cement Handling Equipment
- ___Bulldozers
- ___Cars, Industrial
- ___Central Mixing Plants
- ___Classifiers
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- ___Coal Pulverizing Equipment
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- ___Concrete Mixers*
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- ___Dragline Cableway Excavators
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- ___Dredge Pumps
- ___Drilling Accessories
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- ___Vibrators
- ___Welding and Cutting Equipment
- ___Winches
- ___Wire Rope

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CP-5-55

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FOR SALE

1. FLEMING FM-180 and attachments:

2—6" mold boxes with attachments to make corner, sash, joint, solid, line and ½ blocks; also 1—4" mold box to make 2—4x8x16 blocks at a time, with attachments for solid and ½ blocks. Excellent condition.

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Including 1—15 H.P. Electric Motor; 1—Magnetic Switch; 1—Pushbutton switch; 1—Bucket Elevator for Mixed Material; Molds to make 4", 5", 6", 7", 8", 10" and 12" Drain Tile 12" long.

Also includes table, feed box, jacket, Packer Heads, Pallets and other accessories for making 14", 16" and 18" tile 18" long.

Both Machines in good condition and are in operation.

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Phone: Plant 8823—Res. 3451 or 3668

FOR SALE

1—Model 180 HP, Serial No. 255 Fleming Block Machine with pressure head and 12" frame.

1—6" Mold with half core, bull nose end, square end and sash attachments.

1—6" Mold with half core and bull nose attachments.

1—4" Mold with half core, square end, bull nose and sash attachments.

Mold for Solid Cap Blocks.

1—Model No. 12 Mixer with material hopper.

40—48 Block Steel racks with shelves and 1700—8" pallets made of 2" finished lumber.

Above equipment less than 2 years old and in good running condition.

PRICE: $4,000.00 f.o.b.

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P. O. Box No. 181
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Syntro-Pac fully automatic two block machine complete with pallet feeder, 10 H.P. air compressor, front end conveyor, two pallet off-bearer, five new mold assemblies and five molds that were currently being used. This machine averaged 415 8" block per hour the last month it was used.

Stearns Clipper stripper Model C 84 with one 8x8x16 attachment and 1,000 pallets.

Van-U-Matic, plain pallet, two block machine with air operated off-bearer, 15 H.P. air compressor, 1,050—5/16 x 18 x 18 steel pallets, 4x8x16, 6x8x16, 8x8x16, 12x8x16 attachments with parts for corners, sash and halves, 18 cu. ft. mixer and 25' belt conveyor. In very good condition.

Praschak, two block, semi-automatic complete with 4 x 8 x 16, 6 x 8 x 16, 8 x 8 x 16, 12 x 8 x 16 attachments, approximately 700—6", 1,300—8", 1,600—4", and 1,000—12" pallets, a 21 cu. ft. Praschak mixer and 16' belt conveyor.

Lith-I-Block plain-pallet, two block automatic, complete with off-bearer, 15 hp air compressor, 4x8x16, 6x8x16, 8x8x16, 10x8x16, 12x8x16, and chimney block molds with parts to make corner sash, etc., 1500 ⅛x18x18 steel pallets and 46—60 block racks. In very good condition.

Mid Atlantic Equipment Resale Co.
Box 273 Front Royal, Va.

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Sanford, Florida

USED FORK TRUCKS

Rebuilt with block forks

4000 lb. cap. Clark Dynatork—$1—$2700

4000 lb. cap. Clark pneumatic—$1—$1900

6000 lb. cap. Towmotor cushion—$0—$2000

All prices f.o.b. Wellesley, Mass.

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54 Washington St., Wellesley Hills, Mass.
Phone—Wellesley 5-5630

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1—18 cu. foot Stearns Skip.

1—30 cu. ft. Kelly Mixer with new liners and blades.

All in excellent condition.

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Locust at Water St., Coshocton, Ohio

FOR SALE — BLOCK PLANT IN OPERATION FOR PAST 25 YEARS

Building Supplies, roofing and siding, and block plant. Located in County Seat, southern Michigan town with large farm trading area. Sale includes inventory; plant with Ge Corp Jr. approx. 3 years old, attachments to make 8-inch and 12-inch blocks; lift trucks; 5 delivery trucks; office equipment; steam room; and lease on property. Gross sales over $150,000.00 yearly. Owner has other interests. Will require $40,000.00 to purchase. Plant to be sold as a complete unit. This is a going business.

BOX N-33, CONCRETE PRODUCTS
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WANTED
KIRKHAM VIBRATOR
with mold box

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I have quite a supply of used machines that are replaced by larger plants who need larger production. Some of these setups are in very good condition. As they are a surplus to me, I will sell on any reasonable terms with payments as low as $60.00 a month.

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FOR SALE

Fork and platform power lift trucks, used and guaranteed factory rebuilts.

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MINNEAPOLIS 18, MINNESOTA
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MANAGER
BLOCK MFG. — READY-MIX

Have successfully operated medium sized plant for 10 years. Want connections in S.E. section. Will consider foreign.

BOX N-23, CONCRETE PRODUCTS
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Box N-32, CONCRETE PRODUCTS
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FOR SALE

15 HP Ingersoll Rand Air Compressor mounted on Air Receiver, new condition. $1000.00

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PRICED FOR QUICK SALE

Besser "Victory" Vibrapac with 4", 8", 12" and Brick Attachments $4,800.00
2200 Plain Pallets 13x18½ @ 50c .. $1100.00

Park Ave. Cement Block Co., Inc.
1350 Park Ave. Cranston 9, Rhode Island

FOR SALE

Complete Dunbrik and Duntile Machinery, original cost $40,000.00. Best offer around $5,000 gets it.

Box N-31, CONCRETE PRODUCTS
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Algona, Iowa

Precision Built
VIBRATING TABLES AND CONCRETE MOLDS

CONCRETE MOLD & ENGR. CO.
Battle Creek, Mich.—Phone WO-23417

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INDUSTRY TRENDS
THROUGH
ROCK PRODUCTS

ALSO SEE WHERE TO BUY ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

COLOR YOUR CONCRETE!

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LIMEPROOF CONCENTRATED DRY COLORS

Write for samples and brochure, "Getting Results With Color in Concrete and Cement Products"

SMITH CHEMICAL & COLOR CO.

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Paving mixer, Ransome Model 27 E, Serial 11-282, Single Drum with Buda Power. Has been used very little, Priced $1675.00.

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MAROA, ILLINOIS PHONE 67

FOR SALE

1500 Used Besser Steel Pallets, 18½ x 26 x ¼, flat, square and cleaned .....75c each

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600 Glen St., Scranton, Pa.

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IN YOUR PLANT

PALLET SERVICE CO.

R. 2 — Phone 3-3271 — Oxford, Ohio

We use Besser Equipment

FOR SALE

Four GMC 6x6 trucks. All in top mechanical condition, low mileage. Price twelve hundred dollars each. Also three Hi-Lo transit mixers, and one Smith Load Limit at bargains.

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1—9" Interlocking Block Machine including Franchise—Operated by Air.
1—12 cu. ft. mixer.
20—Steel Drying Racks.
900—8x16 cast steel pallets.
1—35 cu. ft. Worthington Air Compressor.

Davis Interlocking Block Co.

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750—18½" x 26" x ¼" Steel Pallets.

Reasonably priced.

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1100 E. 52nd St., Indianapolis 5, Ind.

PLAIN STEEL PALLETS

Guaranteed Quality

Flat • Square • Accurate

GARY STEEL SUPPLY COMPANY

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CRawford 7-2525

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CEMENT COLORS
MORTAR COLORS

made by

BLUE RIDGE TALC CO., INC.

Henry, Virginia

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GERSON CO.

82 Deering Rd. Mattapan, Mass.

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Manufactured by:

Landers-Segal Color Co.

72 Delavan St. • Brooklyn 31, N. Y.

FOR SALE

Concrete Block Plant, fully equipped and operating. R.R. siding, office building, 6 room apt. 3 acres land.

Fred O. Wildermuth Agency

690 Bdwy. Gary, Indiana

FOR SALE

Besser Super Vibropac Block Machine with 4", 6", 8", and 12" attachments, pallets, and racks.

Concrete Products Supply Co.

University at 30th Ave. N.E.

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FOR SALE

Bros Lectro-Lift Assembly complete with 128" Truck Bed. Used only two months. Priced for quick sale.

Linton Concrete Products

528 Young St., Tonawanda, N. Y.

BLOCK CUBER

Stearns-Warren yardhoist with 20' boom mounted on pneumatic tires. Will handle 4", 6", 8" and 12" blocks. Good condition. Cost $1700.00, will sell for $750.00

Concrete Products Co.

39 Folly Road, Ph. 3-7241, Charleston 50, S. C.

FOR SALE

LITH-I-BAR L-3 MACHINE

Good Condition

Fully Automatic

Complete with racks, pallets, attachments for 4", 6", 8", 12", Flue, Brick, Header, Bullnose.

Inspect and make offer.

This equipment must be sold to pay for new Ready-Mix Equipment.

BADGETT CONCRETE PRODUCTS, INC.

BOX 67 MOUNT AIRY, N. C.

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For the block manufacturer. Help your contractors and bricklayers get quicker, easier and straighter masonry construction with U B tools that carry YOUR advertising. U B Corner Lox, Line-installers, Line Pins and Twigs. We also wholesale a full line of tools for the block layer. Write for catalog and prices.

UNITED BUILDERS
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Muskegon, Michigan

EMPLOYMENT OPPORTUNITY FOR BLOCK PLANT SUPERINTENDENT who is fully qualified to manage production of block plant in the southeast. Write stating age, previous experience, capabilities, and salary expected. This is a tremendous opportunity for a capable, hard working, ambitious man.

BOX N-27, CONCRETE PRODUCTS

309 W. Jackson Blvd., Chicago 6, Illinois

WANTED TO BUY

Used equipment to set up new block plant—need everything.

HASTINGS CONCRETE CO., INC.

P. O. Box 7, Hastings, Nebraska

WANTED

Used Model 50-1 Stearns Block Machine. Must be in good condition.

BOX N-22, CONCRETE PRODUCTS

309 West Jackson Blvd., Chicago 6, Illinois

WANTED

Used Bulk Cement Bin and Screw Elevator, 750 Barrel Capacity.

BOX N-21, CONCRETE PRODUCTS

309 West Jackson Blvd., Chicago 6, Illinois

Plant Layout Design Block Machinery

WITTEMANN MACHINERY COMPANY

FARMINGDALE, NEW JERSEY

Specialists in Concrete Products Equipment

Eastern Representatives of the

COLUMBIA MACHINE WORKS, Vancouver, Washington

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Make More Money as a Manufacturer of DUNBRIK

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Dunbrik manufacturers operate in franchise-protected territories. Generous income potentials. Liberal sponsor co-operation. Dunbrik machines available on lease or sale. Write for "Blueprints for Profit".

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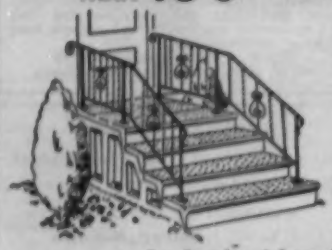
CANADA: Dunn Masonry Machinery Ltd.
924 Dundas Highway, Cooksville, Ont.

NOW MORE THAN **150** LICENSED MANUFACTURERS Producing

Patented
homeward®
Concrete STEPS



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3420 S. W. 9th St. Des Moines (15), Ia.
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AMERICA'S FINEST MOLDS AND LOWERING DEVICES

TERRITORY FRANCHISES
BERG VAULT SYSTEM
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EQUIPMENT DIVISION
1520 LUCAS HUNT RD. ST. LOUIS 20, MO.

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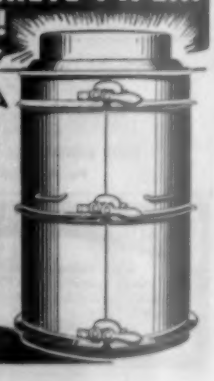
FOR THE FINEST CONCRETE PIPE... YOU NEED FINEST FORMS!

THE *Quinn Standard*



Backed by over 40 years of reliable service, the QUINN STANDARD is recognized as the finest concrete pipe form the world over. Thousands of pipe manufacturers, from the smallest to the largest, look to Quinn for equipment to produce the finest concrete pipe at the lowest possible costs.

★ QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry process. Sizes for pipe from 10" to 120" and larger. Tongue and groove or bell end pipe in any length desired.

WRITE TODAY for complete information and estimates.

Also manufacturers of QUINN CONCRETE PIPE MACHINES

Quinn WIRE & IRON WORKS
BOONE, IOWA

"MY No. 8 *Columbia* AUTOMATIC JUST CANNOT BE BEAT"

Says James Allan Jarvie,

President, Superior Masonry Products, Ltd., Lethbridge, Alberta

Superior Masonry Products Limited

CINDER-CRETE AND CONCRETE BUILDING UNITS

Lethbridge, Alberta

March 14th, 1955

Mr. Fred Neth, President,
Columbia Machine Works,
107 South Grand Avenue,
Vancouver, Washington.

Dear Fred:

In answer to your recent letter as to how I like my No.8 Automatic Columbia, well Fred, it just cannot be beat. When I bought my machine in 1950 I had just enough money to buy pallets and racks for 1400 - 8" units. As profits piled up; more and more pallets and racks were bought, the plant was enlarged and now have facilities for the handling and making of 8000 - 8" units or equivalents every two 8 hour shift per day.

Last year after installing your Pallet Cleaner and Automatic Splitter, profits showed a marked upward climb.

This machine has given me every satisfaction for the following reasons:-

(1) Low cost of molds
(2) Rapid changing of molds
(3) Large volume of blocks produced at a low initial cost
(4) Easy to clean and maintain
(5) Capable of making units 4" 6" and 8" high
(6) Small repair bills
(7) Last but not least - your personal interest in my operations and your extra prompt service

Installation of a new Automatic 10-12" high machine is planned for the near future in order to make drain tile and other 12" units so as to increase sales for extra profits.

Sincerely yours,
James A. Jarvie
President.

Canadian Block Maker Grows with *Columbia*....

James Jarvie's warm respect for Columbia machines is not based on sentiment, but on cold production figures ... figures which reflect high production, low-cost maintenance, flexible output, and small investment per unit of block. And when he planned to expand his plant, naturally he turned to the machine which helped him gain his present position ... Columbia!

***District Offices in:* Wisconsin, Ohio, South Carolina, Mississippi, Florida, New Jersey, Virginia, California and Massachusetts.**

Write today for catalog and complete information on Columbia Concrete Block Machines and Equipment.

Columbia MACHINE

Home Office: 107 S. GRAND AVENUE VANCOUVER, WASHINGTON

Factory Branch and Warehouse in Mukwanago, Wis.

NEW STEARNS ...Introduces a new DIRECT-DRIVE mixer

NEW NEW NEW NEW

NEW Stearns Direct-Drive Mixers eliminate clutch, pulley wheel, V-belt drive, counter shaft and counter shaft bearings, drive gear and pinion . . . reduces maintenance.

NEW Stearns Direct-Drive Mixers feature the gear-head in a sealed oil bath . . . for longer efficient operation.

Plus these standard Stearns features:

- Anti-friction bearings on blade shaft.
- Ni-hard sectional type drum liners.
- Water distributing manifold.
- Ni-hard mixing blades.
- Air operated door.
- Drum grid cover.

You'll bring operating expense and maintenance costs . . .*way down*, while *raising* your block plant efficiency with the new, exclusive Stearns DIRECT-DRIVE mixer. Elimination of pulley, clutch and V-belt drive . . . reduces maintenance . . . lengthens mixer life . . . means fewer moving parts. This *new* Stearns mixer is offered in 42 or 50 cubic foot capacities, which also includes ruggedness, stamina and low maintenance features . . . a result of Stearns long experience in the building of quality block-making machinery.

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STEARNS
MANUFACTURING COMPANY · INC
ADRIAN · MICHIGAN

FOR LONGER SERVICE · GREATER PROFITS

Complete Concrete Products Plant Equipment — Standard of the Industry

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LIQUIDATION!
ORE MILL EQUIPMENT
FRANKLIN, N. J.

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1—12"x12" C.P., Class NSB 392'.
1—17" and 10"x12" C.P., Class OCB, 788'.
1—25"x15¾"x18", 1-R-PRE-2-2056', 3 phase 440/2300 V.

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1—90' DORR Bowl Rake Thickener.
1—24' DORR Bowl with 5'x22' rake.
2—DORR 5'x24', 2 deck, 2 section.

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29—SCREW, 6" to 24" D., 10' to 129' L.
29—BUCKET ELEVATORS, Belt and Chain Type, 25' to 100' high, bucket sizes from 3"x4" to 22"x19".
86—TROUGHING BELT, 14" to 30" wide, 22' to 264' lengths.
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1—15 ton American Terry steel derrick, 60' mast, 55' boom.

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1—15 ton Brown Hoist Locomotive Crane.
1—150 HP VULCAN size 72, single drum mine hoist.
15—LR. and Sullivan 15 HP AC, 2-drum scraper hoist.
1—15 ton American Terry steel derrick, 60' mast, 55' boom.

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4—26" x 15" Sturtevant.
2—32" x 36" Edison.
2—36" x 36" Edison.

DRYERS
1—6'4½" D. x 12' L. Link Belt, Soto Louvre Dryer, Mashler oil heater.
1—6' Oliver Drum Dryer.

ELECTRIC MOTORS
800—½ to 700 HP, including Geared head motors and motorized speed reducers to 50 HP.

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29—American, Buffalo & Claridge, Nos. 5, 6, 17, 21, 25, 60, 80, and 100.
1—Schneible Multiple Wash Dust Collector.

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3—13½'x8' Oliver Drum Filters.
1—6' Oliver Filter Table.

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2—1½ ton Atlas, 24" gauge.

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4—Man Cages.
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1—4'x8' Trommel Screen.
1—Ross Feeder.
8—Automatic Weight Hoppers.

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3—Wilfley, 2", 3", 4".
9—3" Morris Manganese.
27—Addt'l. Pumps, Centrifugal, Triplex, Vacuum, & Sump, up to 5450 GPM.

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35—Gardner Denver CF-79 Drifters.
3—Gardner Denver R-91 Stopers.
4—Sullivan S-10 Stopers.

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7—4'x5' Hummer, type V16, 32 & 68.
8—Hummer, type 400, 4' x 8'.
11—Tyler Tyrock F-300, 4'x10'.
6—4'x10' Selecto.
3—12 KVA, 15 cycle MG Sets.

STEEL STORAGE TANKS
8—7'1" Dia. x 7'5½".
2—8' Allen Cones.
12—8' Dia. x 6'.
2—11' Dia. x 20'6".
2—Cone Tanks, 16' Dia., 13'10½" Deep.
2—14'2" Dia. x 17'.
5—16' Dia. x 27'.
3—28' Dia. x 30'.

WILFLEY TABLES
48—5'3" x 12'10½" steel frame with No. 6 enclosed head motion.

Detailed inventory mailed upon Request
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Liquidators

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Phone Franklinborough 8-4281
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BONDED
SCREENS-CONVEYORS-IDLERS BELTING - FEEDERS - REDUCERS

WRITE, WIRE OR PHONE — IMMEDIATE SHIPMENT FROM OUR FACTORY

NEW BONDED® HEAVY DUTY VIBRATING SCREENS
"For Continuous, Economical Screening of High Tonnages"

More than 3000 mines and quarries have modernized with Bonded equipment

For mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry. **HEAVY DUTY MODELS:** 4-bearing, positive throw, eccentric shaft; 3'x8' to 5'x14', 1 to 5 decks. **TYPE A SCREENS:** eccentric weight mechanism, spring mounted, 1 to 3 decks, 2'x4' to 3'x8'.

Heavy Duty Screens from $1095.00 General Purpose Screens from **$395.00**

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS

Complete Ready-Fab sections quickly and easily joined together on the job. We take our loss on our stock of short length belting. You can save as much as 50% on the **BONDED CONVEYOR SPECIALS** listed, with conveyor belting in two pieces. Conveyors are equipped with 5" roll diam. idlers and return rolls, 20" diam. head pulley and 16" diam. tail pulley mounted on 2¼" or 2-7/16" diam. shaft. Belt is new 4-ply, 28-oz. duck, ⅛" top rubber cover x 1/32" bottom cover and is fresh stock made by leading manufacturers.

CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
14"	25'	$1080	$ 622
14"	50'	1030	985
16"	20'	991	548
16"	45'	1785	937
16"	60'	2300	1170
16"	85'	3162	1558
18"	25'	1229	684
18"	45'	1839	1005
18"	60'	2384	1254
18"	85'	3209	1685
18"	100'	3704	1912
20"	25'	1265	713
20"	45'	1965	1060
20"	60'	2490	1320
24"	25'	1322	773
24"	45'	2062	1145
24"	60'	2617	1426
24"	100'	4097	2166
24"	130'	5207	2773
30"	25'	1421	847
30"	65'	3101	1718
30"	85'	3731	2144

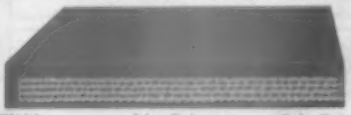
LONGER CONVEYORS WITH EXTRA FEATURES
In addition to features described at left, these conveyors include Gravity Takeup, Lagged Head Pulley, Self Cleaning Wing Tail Pulley, Head Shaft and Bearings 2-15/16", Tail Shaft and Bearings 2-7/16", Side Guide Idlers—(1 pr. each for Head and Tail.) Snub Roll at Head and 12¾" diam. using 1-15/16" shaft and bearings. Ratchet and Pawl Holdback. Return belt cover at slight extra cost.

Belt Width	Length of Conveyor	List Price	Sale Price
18"	150'	$ 6,209	$3,597
18"	200'	7,859	4,336
18"	250'	9,509	5,164
18"	300'	11,159	5,993
24"	150'	6,820	3,949
24"	225'	9,595	5,356
24"	300'	12,370	6,763
30"	150'	7,664	4,479
30"	220'	10,404	5,971
30"	300'	13,964	7,677

Other lengths and belt width at bargain prices.

NEW CONVEYOR BELTING
SAVE UP TO 28%

Heavy duty 4-ply, 28 oz. duck, ⅛" top rubber cover x 1/32" bottom cover rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.



Width	List Price	Sale Price
14"	$3.23 foot	$2.58 foot
16"	3.64 foot	2.62 foot
18"	4.03 foot	2.90 foot
20"	4.42 foot	3.35 foot
24"	5.23 foot	3.76 foot
30"	6.39 foot	4.60 foot

Additional widths and plies available at low prices. Write for free sample.

NEW IDLERS AND RETURN ROLLS
25% BELOW LIST PRICE

3-roll, 5" diameter Troughing Idlers for

14" Belt	$16.50	24" Belt	$18.75
16" Belt	17.25	30" Belt	19.50
18" Belt	18.00	36" Belt	20.25
20" Belt	18.25	48" Belt	21.75

1-roll, 5" diameter Return Idlers for

14" Belt	$ 6.38	24" Belt	$ 7.50
16" Belt	6.75	30" Belt	8.25
18" Belt	7.13	36" Belt	8.75
20" Belt	7.30	48" Belt	10.25

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. Either sealed type (pre-lubricated) or with alemite fittings. Rust proof ball races. Maintenance is negligible.

NEW BONDED GEAR REDUCERS

H.P.	RATIO	PRICE
3	20:1	$ 81.60
5	20:1	142.80
10	20:1	238.60
15	20:1	286.90
2	30:1	81.60
3	30:1	142.80
5	30:1	226.60
7½	30:1	228.60
10	30:1	284.60
15	30:1	394.60

Reducers are right angle with worm on bottom. (Under driven) and all models are fan cooled. Other sizes and ratios available at bargain prices.

Write for Catalog and Prices

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128 BELLVIEW, COLUMBUS 7, OHIO—PHONES: Hickory 4-2186; FRanklin 6-8898, Evenings

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Interested in being employed by small aggressive lightweight aggregate producer in the east. We have openings for qualified applicants who have experience in sales, engineering and production. Applicant must have at least 5 years experience in a field that will have given him the necessary capabilities. In reply state age, education, experience, present employment, personal data and salary expected. Replies confidential.

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SURPLUS EQUIPMENT—WILL SACRIFICE

1—Used P. & H. Model 1055 Standard Shovel, 3½ Cu. Yd. Dipper, Caterpillar D-364 Diesel Engine. Parts & Tools. Good condition.
1—Used 75C Haiss Material Loader, Self-propelled, Gas Engine. Good Condition.
1—Used Bucyrus Armstrong, Model 29-T, Electric Churn Drill, Parts & Tools. Good condition.
1—Used Bucyrus Armstrong, Model 27-T, Electric Churn Drill, Parts & Tools. Good Condition.
1—New Bucyrus Erie, Model 12, Electric Bit Dresser, Combination 10-10A. Tools. Never used.
1—Used Bucyrus Armstrong No. 8 Electric Bit Dresser & Blower. Good Condition.

Big Rock Stone & Material Co.
Little Rock, Arkansas

FOR SALE

1—150 H.P. Sauerman Slackline Cableway, Electric power, Dual drum hoist, controls; 100 ft. mast, blocks, bridle & bucket carrier, 1½ yd. bucket. All new 1½" and 1¼" guy cables.

Price $4000.00

STATE WASHED SAND & GRAVEL CO.
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48" x 60" Traylor Bulldog Jaw.
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42" Belt Conveyor.
1—42" x 900' Link Belt, New 1953.

LOCOMOTIVES & CRANES

15 ton diesel 60' Boom Whirley crane.
3—65 & 44 ton G.E. diesel elec. Locomotives.
10 ton Plymouth diesel locomotive.
4—125 Ton G.E. Diesel elec. locomotives.
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Kent Model 23 Continuous Mixer.
Abbe 27" x 30" Ball Mill Chrome-Mang. lined.
Raymond #00 and #1 Pulverizers.
Kilns, Dryers, Filters, Hammer Mills, Crushers.
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FOR RENT
1½ yd. clamshell-dragline 604.
Mounting with Caterpillar diesel engine, 60' boom.

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HD-14 AC Tractor.
2—1½ yd. clamshell buckets.
Joy-Sullivan 160' electric air compressor.

COOGAN GRAVEL COMPANY
903 Jefferson Building, Peoria, Illinois

ROCK PRODUCTS

HAS THE LARGEST ABC CIRCULATION AND HIGHEST RENEWAL PERCENTAGE IN THE NON-METALLIC MINERALS INDUSTRY

IF YOU ARE OVER 45 and your wife keeps insisting that you should have *two* chest x-rays every year... don't blame her. *Thank* her! Semi-annual chest x-rays are the best "insurance" you can have against death from lung cancer.

The cold fact is that lung cancer has increased so alarmingly that today you are six times more likely to develop lung cancer than a man of your age 20 years ago. Our doctors know that their chances of saving your life could be as much as ten times greater if they could only detect lung cancer before it "talks"... before you notice any symptom in yourself. That's why we urge you to make semi-annual chest x-rays a habit—for *life*.

To see our new life-saving film "The Warning Shadow" call the American Cancer Society office nearest you or simply write to "Cancer" in care of your local Post Office.

American Cancer Society

ALSO SEE READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT
WHERE TO BUY ADVERTISING IN CONCRETE PRODUCTS SECTION

FOR VALUES — BUY BRILL

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2—9'x80' Allis-Chalmers, ¾" shell.
1—8'x125' Vulcan, ¾" shell.
1—8'x70' Allis-Chalmers ¾" shell.
3—6'x25', 6'x30', 6'x40' steam tube.
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1—5'x40' Cummer ¾" shell.
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1—4'6"x30' Vulcan ¾" shell.
2—3'10"x16' Link Belt Roto-Louvre.
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1—Raymond High Side Mill, 5 Roll.
2—Pennsylvania Model SXR-100, 100 Tons per hour.
5—Hardinge 4½'x16", 5'x22", 6'x22", 6'x 48", 10'x48".
3—Patterson 6'x5' Ball Mills.

CRUSHERS

2—Allis-Chalmers 10" Superior McCully Crushers, V-belt drive.
1—Allis-Chalmers K-9 Gates Gyratory Crusher.
10—Jaw Crushers 5"x8" to 42"x48".

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6—Tyler Hummer Screens 3'x5', 4'x5', 4'x7', 4'x10', 5'x10', 4'x15'.
1—Link Belt 3'x8' double deck screen.
5—Rotex 40"x84", 40"x120".
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2—Chicago 14"x7" Air Compressors, 454 cfm.
2—Oliver Rotary Dewaterers 8'x4'.
12—Bucket Elevators 20'x75' centers.
250 ft. Link Belt 12" Troughing Conveyor.

PARTIAL LIST

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740' 42" 8 ply conv. Belt. (New).
Allis-Chalmers R322 gyratory.
New & Used Elev. Buckets, assorted sizes.
American Clay disintegrator 24" wide.
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Whitcomb 10 ton loco. 36" ga.
908' 42" 6 ply Conv. Belt (New).
Jeffrey-Traylor 18x48 conveyand-screen.
75 assorted gearmotors to 20 hp.
Pioneer 54 x 24 roll crusher.
Philadelphia reducer 30 hp motor.
Bonded Scale 12 x 16 Cinder Rolls.
Spencer turbo 3 hp vacuum cleaner.
Koppers reducer 27¼ to 1, 20 hp.
Hummer motor-generator sets.
American 4" pump 140' H. 600 gpm.
Miscellaneous gears to 72" dia.
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V belt pulleys to 60" dia.
Lidgerwood one drum 30 hp winch.
Gravity roller conveyor 24" x 110'.
Traylor 10x16 H Blake type crusher.
Putnam Lathe 20" x 10' Bed.
Hummer type 31 screen 6' x 5'.
140 Reducers ⅛ to 30 hp.
Sturtevant #0 rotary crusher 2 HP.
Champion 9x16, lever type jaw.
Gravity roller conveyor 16" x 150'.
1 phase vertical gearmotors, 6 rpm.

G. A. UNVERZAGT & SONS INC.
36 COIT STREET, IRVINGTON, N. J.

FOR SALE or RENT

EQUIPMENT IN EXCESS OF OUR IMMEDIATE REQUIREMENT:

(2) Lima Shovels Model 2400, 6 yd. capacity. Cat. V12 with super charge and Torque Convertor. Location, Minnesota.

(1) 1201 Lima 3½ yd. Shovel. Latest model and latest equipped. A-1 condition and ready to go to work. Location, Minnesota.

(1) Lima 802 2 yd., Torque Convertor, shovel front, 24'6" boom, 12' dipper stick. Location, Minnesota.

(1) Lima 603 with shovel front. Approximately $2000.00 worth of spare parts. Diesel power. Location, Iowa.

(1) 603 Lima, 60' boom, rudamatic tagline, and fairleads. Cat. Diesel Engine. Machine in excellent condition. Location, Iowa.

(1) Lima 34 Paymaster. Combination Pull Shovel and Crane Boom. GMC 671 diesel power. Location, Minnesota.

(1) Marion 2½ yd. Shovel with Buda Diesel. Approximately $6000.00 worth of spare parts. Location, Minnesota.

(1) 2 yd. Marion all electric Shovel. Location, Minnesota.

(1) Marion all electric combination Shovel and Crane. Location, Mich.

(2) 40 ton Locomotive Cranes. Location, Minnesota.

(1) 20 ton Industrial Locomotive Crane. Location, Minnesota.

(1) Bucyrus Erie 44B combination Shovel and Crane. Good condition. Location, Minnesota.

(1) 37B Bucyrus Erie 1½ yd. Machine has new D13000 Cat. engine. Location, Minnesota.

(1) P&H Model 700 combination Shovel and Crane. GM power. Excellent condition. Location, Minnesota.

(1) P&H Model 955 with shovel front. D17000 power. Location, Illinois.

(1) 80D Northwest 2½ yd. Shovel. New in 1952. Location, Minnesota.

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(2) 1¼ yd. Northwest Cranes, 55' booms. Engines rebuilt in 1955. Location, Wisconsin.

(1) 1¼ yd. Northwest with 55' crane boom and shovel front combination. Location, Michigan.

(1) 1¼ yd. Northwest, combination shovel and 50' crane boom, fairleads. Location, Michigan.

(1) 1¼ yd. Northwest, 65' crane boom, high gantry, extra long crawlers. Location, Michigan.

(1) 1¼ yd. Northwest, 45' crane boom, fairleads, lights. Location, Michigan.

(1) No. 6 Northwest, long, wide crawlers, 65' boom, high gantry. Location, Wisconsin.

(1) Model 25 Northwest, shovel and crane combination, new in 1953. Location, Wisconsin.

(1) Unit ⅝ yd. with shovel front. Was new in 1948. Overhauled and rebuilt in 1955. Location, Wisconsin.

We carry one of the largest spare parts stocks for Model 104 Northwests in the country.

(15) 1½ yd. Clamshell Buckets. (2) 2 yd. Clamshell Buckets.

(2) Austin Westerns, combination shovels and cranes. Rebuilt and working every day.

(1) 4 yd. Koehring, Tilt Mixer. New.

EUCLID AND MACK TRUCKS

(8) 30 ton Mack end dumps. Model F-C-S-W. Serial No's. 1244-47-52-53-55-56-59-60. With approximately 50 tons of spare parts. Location, Minnesota.

(33) Euclid, Mack, and Darts. All end dumps, from 12 to 34 ton. Late model trucks. All above trucks are painted, cleaned, overhauled and ready to go into operation.

(6) 59TD, 22 tonners. Serial No's. 14913-15723-24-25-27-28.

(10) No. 8TD, 22 tonners. Serial No's. 6581-82-84-89-72-96-90. Have N-H-R-S Cummings engines and heated boxes.

BLAST HOLE DRILLS

(1) 27T Bucyrus Erie Blast Hole Drill complete with tools.

(1) 22T Bucyrus Erie Blast Hole Drill complete with tools.

(5) 29T Bucyrus Erie Blast Hole Drills complete with tools.

(2) Core Drills complete with tools. All the above Drills are located in Minnesota.

TRACTORS, SCRAPERS AND GRADERS

(1) TD24 International with dozer and PCU.

(2) TD24 Internationals with PCU and Pusher Plates.

(1) D8 Cat. and 12 yd. Scraper. Also Bulldozer. Manganese tracks. Machine rebuilt in 1955.

(1) D8 Cat. with Cat. 80 Scraper. New in 1954.

(2) Tourneau Dozers with 671 GM engines.

(1) Root Rigger.

(3) Galion, Model 118, Motor Patrol. New in 1953.

The above machines are located in Minnesota.

TRUCKS AND TRAILERS

(1) 20 ton 6 by 6 Reo Tractor with front winch. Mileage—6000.

(2) White W-22.

(1) Model W-26 with dump body.

(3) F8 Ford 1952 tandems. 14' light weight dump bodies.

(8) 5 ton 4 wheel drive Federals with 510 Hercules engines and 5th wheel, 920 rubber.

(3) LF 195 International Tractors. 450 engines. Large Henderson dollies. Tandem.

(1) Auto Car with single axle Gram Trailer. Semi dump.

(1) New 50 ton Low Boy Trailer. Legal width.

(1) Heavy duty Low Boy with tandem diesel Tractor.

(1) TD14, with 2 yd. Drott Loader. New condition.

(9) Tandem axle Semi Dump Trailers. Cable lift.

(4) Single axle Semi Dumps.

CRUSHERS

(1) 2036 Universal Jaw Crusher.

(1) 25 by 40 Roller Bearing Jaw Crusher.

(1) Cedarapids Pitmaster Portable Crushing Plant. New in 1954.

The above equipment is located in our Wisconsin, Michigan, Indiana, Illinois, Minnesota, and Iowa plants.

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N-W 50-D 2½ yd. Dragline. Diesel, 100′ boom.
N-W Model 6, 1½ yd. Diesel Shovel.
Northwest 80-D Diesel Shovel 2¼ yd. New 1951.
Lorain L-820 3-yd. Shovel-Drag-Crane 100′ bm.
Lima 1201, 2½ yd. Diesel Shovel.
Manitowoc 3500, 2½ yd. High Lift Shovel.
Buc-Erie 54-B Diesel Shovel, 2¼ yd.
Manitowoc 3500 Dragline, 140′ boom, new 1950.
Northwest 25 Diesel, ¾ yd. Shovel.
Lorain Model MC 414 Moto-Crane, 50′ boom.

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40, Eagle 20x36, Diamond 24x36", Cedar Rapids 10x20, 20x36, 25x40, Farrell 10x20, 13x30, 14x36, 18x36, 36x48, Buchanan 30x42, Good Roads Reliance 15x30, Traylor 18x36, 24x36, Allis-Chalmers 30x18, Good Roads 10x30, Telsmith 18x22, Champion 1030, 1040, 1236, 1530.
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14" Newhouse, 24", 30", Gyrasphere, 10", 28" Intercone Telsmith, Telsmith 5H, 10-H, 12-H, 16-B, Kennedy Van Saun 7, 10, 25"S-6, 37, Traylor TY6, TY9, Ty 2'4", T-4½", .
ROLL: Cedar Rapids 40x20, Diamond 46x22, Pioneer 30x18, Telsmith 24x16, Pioneer 30"x18", New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania HX2, 22x32, Cedar Rapids 20x23, Jeffrey 30x42, Jeffrey 36x36, 36x30.
BALL MILL: Hardinge 10'x10", K.V.S. 6'x9' Type M Air Swept J-H 6'x8', Hardinge Conical 6'x12", Colorado Iron Works 5'x5'; Marcy No. 64½, Hardinge conical 10'x10".
ROD MILL: Marcy 3'x6', 5'x6', Allis-Chalmers 4'x8', Hardinge No. R 206, Marcy 6'x12', Hardinge 5'x20".
CONE: Symons 2' and 5' coarse bowl 4' short head.
TUBE MILL: Smidth 5½x30, K.V.S. 4'x7', Traylor 5'x22'.
DRIERS: Vulcan 4½x50', others 1'x20', 6'x50', 7'x70', 6'x40' and Cedar Rapids 60"x14'.

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Cedar Rapids "Pitmaster" port. washing-screening.
Cedar Rapids Portable Super Tandem, excellent.
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Pioneer WA-300, crushing, washing, screening.
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Cedar Rapids 4823 hammermill, complete, excellent. Diesel.

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Gramen 100 bbl. tandem axle air slide. New 1951.

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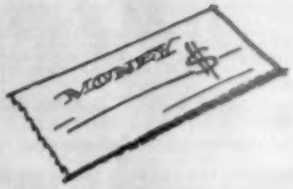

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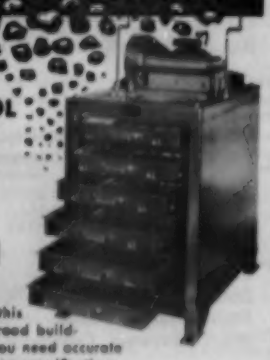

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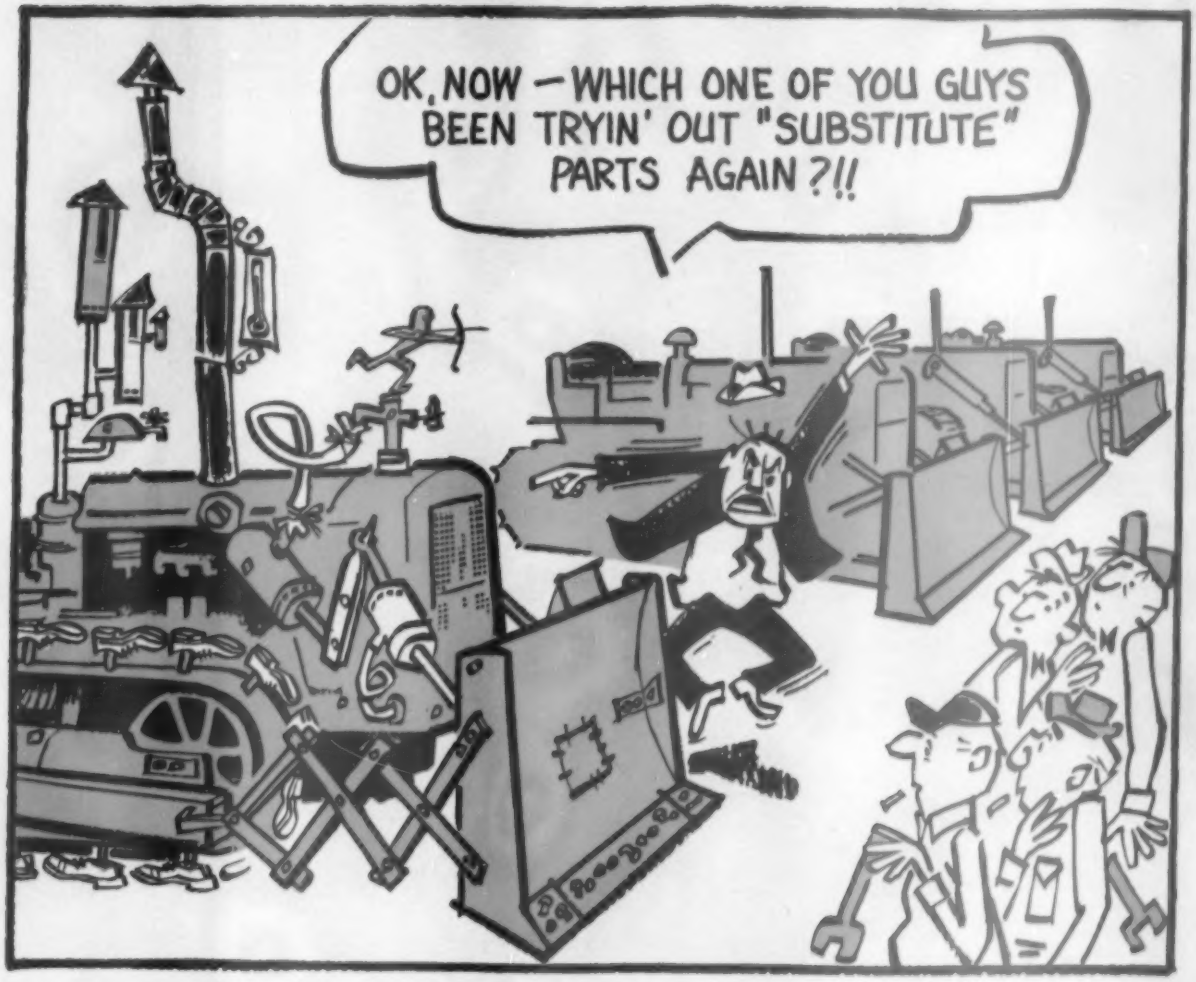

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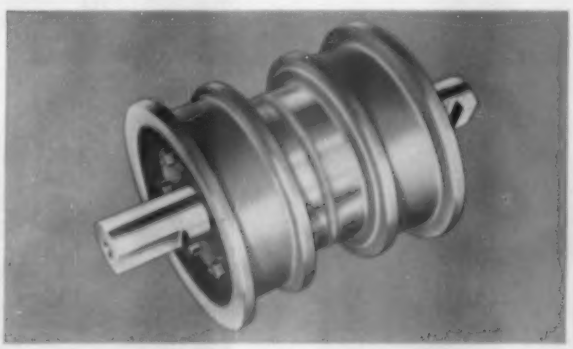

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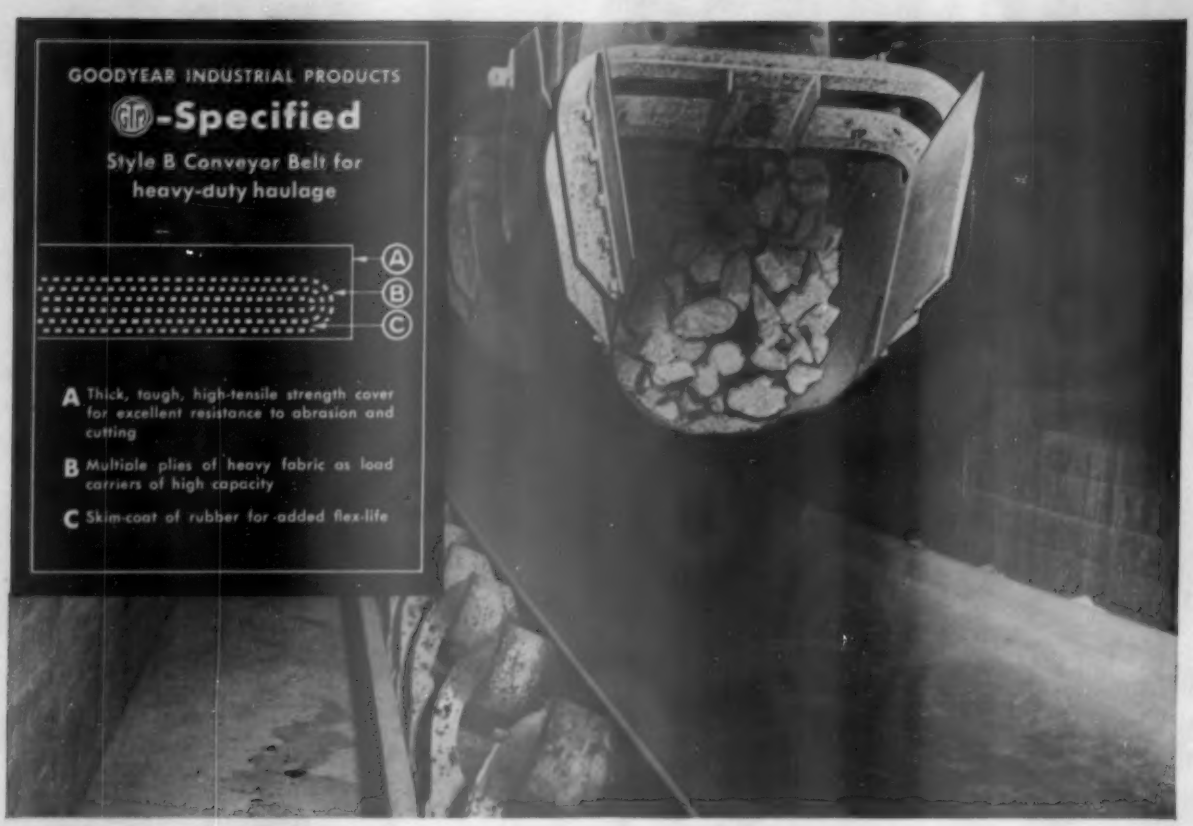
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